# ELECTRICAL WEST

January 1951
25 Cents

How To Be A Good Boss, Page 53
Appliances, Page 75

SPOKESMAN FOR THE MOST HIGHLY ELECTRIFIED REGION OF THE U. S.

# Cover-age!

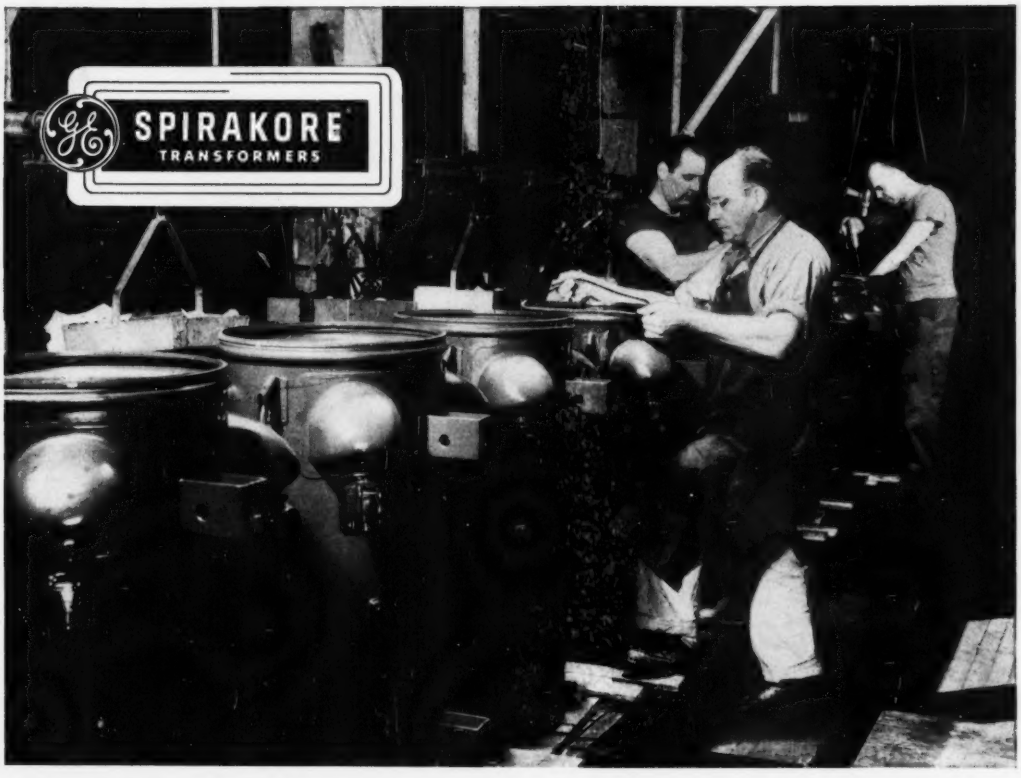
On the sure ground that everyone sleeps, it can be said that everyone is a prospect for an electric bed covering sale! Which means that the whole market is a pretty extensive one.

Obviously, however, some prospects are better than others, and these should be cultivated more intensively.

Edison electric bed covering advertisements are doing *both* jobs — with dealers profiting. Sales messages like the ones reproduced here tell the story — in newspapers and direct mail — to every home in Edison territory, with magazine advertisements increasing the impact on the most likely prospects.

It's what you might call "blanket coverage" — in more ways than one! Edison tells them, and the dealer sells them.

Edison SOUTHERN CALIFORNIA EDISON COMPANY




# AIR-TIGHT SEAL MAKES SPIRAKORE* TRANSFORMERS LAST LONGER

*Breathing is stopped* in General Electric Spirakore transformers. A Nitrile rubber gasket—resistant to oil, age, sunlight, or operating temperatures—seals every opening in Spirakore transformers. Sealing is so complete that hottest summers and coldest winters won't draw moisture or dust into the tank. Transformer life is prolonged.

With this sealing *accessibility is actually improved.* Unclamp the tank cover and it lifts right off. No adhesives to break—no surfaces to clean before resealing. You even re-use the gasket.

This better sealing is only one of the reasons why Spirakore is the finest transformer you can buy. The full story is told in our new bulletin GEA-5400. If you haven't received your copy ask your G-E representative, or write *Section C 402-103, Apparatus Dept., General Electric Company, Schenectady 5, N. Y.*

* Registered trademark of the General Electric Co.

On large tanks, Nitrile rubber gasket of circular cross-section is compressed as shown. A ring welded to the tank keeps the gasket in place and prevents too much compression.

On small tanks, a Nitrile rubber gasket of square cross-section is compressed between rim of cover and deep-rolled flange on tank. Shown uncompressed.

402-103

GENERAL ELECTRIC

With factories in Anaheim, Los Angeles, Oakland, Ontario, San Francisco, San Jose, Seattle, and Richmond, and Sales Offices in twenty Western cities.

**JANUARY 1951**

**SPOKESMAN FOR MOST HIGHLY ELECTRIFIED REGION OF THE U. S.**
The all-industry magazine of progress, established 1387, and incorporating the "Electrical Journal," "Journal of Electricity, Power and Gas" and "Journal of Electricity." Contents copyright. Sixty-third year of publication

**VOL. 106 NO. 1**

# ELECTRICAL WEST

George C. Tenney, Editor
W. A. Cyr, Associate Editor — Walter C. Heston, Engineering Editor
Peggy Boyer, Assistant Editor — John Coots, Typography

## FACTS AND FIGURES

The February issue will be our annual review of utility accomplishments for 1950, and plans for 1951. Look this year in particular for some vital facts and figures. National statistics added to those for the West will show the industry's plans for measuring up to the mobilization job ahead. Construction budgets are going to be up, 10% or more, from the near record of $395 million for 1950.

Load increase of individual utilities of the West set new records all the way around — that we know already. Electrical West's exclusive feature — the Calendar of New Generation, will take on added value this year with its accurate figures for the West.

Sales and load-building activities of Western utilities will be given the customary coverage with the usual valuable indices and outlook for the coming year. Commercial plans for 1951 will be of especial interest in view of the war outlook.

Last year, after much research, we established a new index correlating the expenditures of the utilities for new construction with the amount that would be spent on the customer's side of the meter for utilization equipment. That will be done again this year.

In addition to this summary the February issue will contain the usual coverage of industry events.

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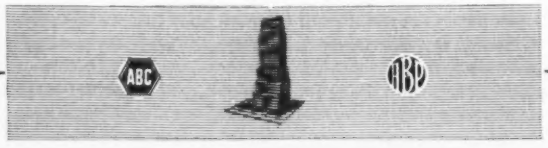
ADVERTISING REPRESENTATIVES

Chicago (11) ..... Michael J. O'Connell, 520 N. Michigan Ave.
Cleveland (5) ..... Frank J. Seiler, 1510 Hanna Bldg.
Los Angeles (17) ..... W. D. Lanier, 1111 Wilshire Blvd., MA. 6-4323
New York (18) ..... Walter Klein, 330 W. 42nd St.
San Francisco (4) ..... Tom Carmody, 68 Post St., DO. 2-4600

Cover: Washington Water Power Co. photo

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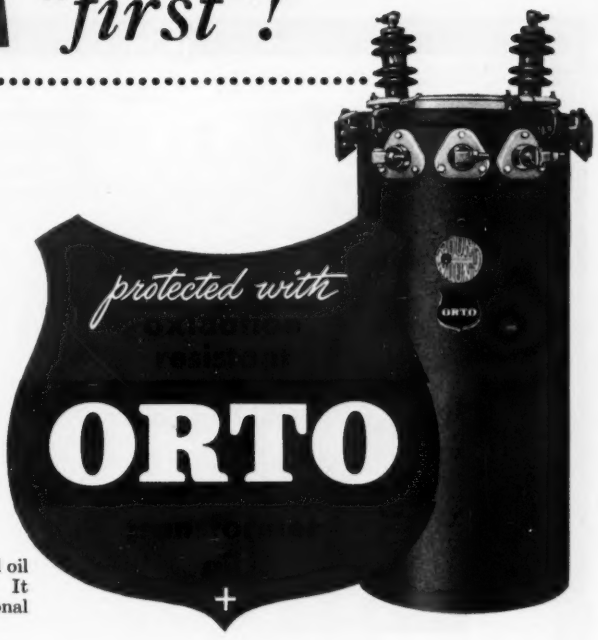
# *Another* **L-M** *"first"!*

**L-M was the first to announce the use of inhibited oils in its transformers, and has set the pace for the entire industry. This is another example of L-M leadership in product improvement through advanced research, development and testing.**




## a revolutionary new development in transformer oil

"ORTO"* brand oil is a revolutionary new inhibited oil that resists oxidation, acidification, and sludging. It lasts several times as long as a high-grade conventional oil. Therefore it offers these advantages:

**1** **Improved overload capacity**

**2** **Longer transformer life**

**3** **Lower maintenance costs**

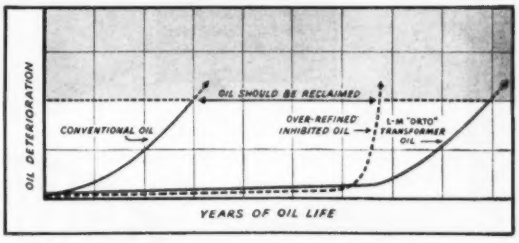
"ORTO" brand oil has been thoroughly tested. Its advantages are conservatively stated. It does not deteriorate suddenly after the inhibitor has been used up. In "ORTO" the inhibitor lasts many years. After that the oil still has inherently long life, with normal resistance and characteristics; and it then simply begins the normal rate of deterioration.

All this time "ORTO" has kept cooling oil passages clear of sludge, permitting the original unrestricted oil circulation, and maintaining the original high short-time overload capacity. By preventing the formation of acids, "ORTO" has protected cellulose insulation from deterioration, and has prevented the corrosion and rust caused by acidified oil.

*"ORTO" brand oil is now available in L-M Round-Wound and other L-M distribution transformers.*

Ask the L-M Field Engineer for complete information, or wire or write Transformer Sales Department, Line Material Company, Zanesville, Ohio (a McGraw Electric Company Division).

*Trademark




Comparative curves show the deterioration of transformer oil in service. A high-grade conventional oil deteriorates at a gradually accelerating rate. Over-refined oils may have a better response to the inhibitor; but once the inhibitor has been used up, the oil has little resistance to oxidation, and deteriorates rapidly. "ORTO" brand oil is a high-grade conventional oil with an inhibitor which greatly extends the beginning of the deterioration, which, when it finally starts, assumes the same gradual curve as with *any* high-grade conventional oil.

● **"ORTO" oil is now available in bulk or as a concentrate for use in your existing transformers regardless of make or rating. Ask your L-M Field Engineer for details.**

10-1-R

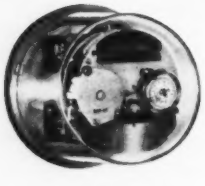
**LINE MATERIAL... Transformers**

SANGAMO Covers the WEST

Also Distributors in other Important Cities.

SANGAMO

TIME SWITCHES



METERS

*No Other Commodity is Measured so Accurately as Electric Energy*

SANGAMO ELECTRIC COMPANY

SPRINGFIELD, ILLINOIS

93480-10

# PLANT POWER-PROBLEM:

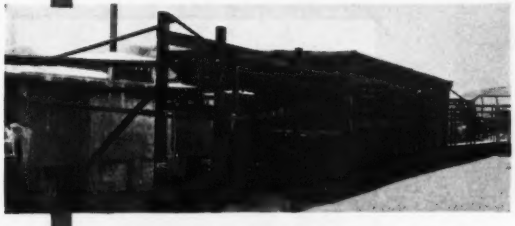
***Costly outages caused by phase-to-phase flashovers and burndowns in open wiring strung in chemical atmosphere***

# SOLUTION:

## OKOLITE-OKOPRENE

### SELF-SUPPORTING AERIAL CABLE

**COMPACT AND ECONOMICAL—Self-evident space economy combines with reasonable installation and low maintenance costs. 3/C #4/0 Okolite-Okoprene Self-Supporting Cables supply lighting for the various buildings.**



**DURABLE AND DEPENDABLE—Permanently weather-proof with no ring-cutting or lead sheath troubles. Long-lived, trouble-free circuits assured. 3/C, 500,000 CM Okolite-Okoprene 5 Kv Cables distribute power from sub-station to sulfite mill, beater room and screen room.**

Dust, moisture and acid fog prevalent in the atmosphere surrounding the Rumford, Maine, mill of the Oxford Paper Company posed a problem in power circuit maintenance. The combination of these elements made it practically impossible to keep even the over-voltage insulators and wooden structures from becoming conducting to the point where even 2,300 volts resulted in phase-to-phase flashovers and burndowns. Moreover, burndowns of upper circuits would often cause loss of lower circuits through repeated burnouts as top wires dropped to underlying layers.

Solution of this serious problem was found in the substitution of Okolite-Okoprene Self-Supporting Aerial Cable for open wires. According to company officials, the combination of Okolite high voltage moisture and heat resisting insulation protected by non-conducting weather and chemical resistant Okoprene sheathing has eliminated this trouble.

With greatly reduced service interruptions and outages, Oxford engineers anticipate substantial reductions in maintenance costs. Other industrial users have had similar experiences and point out that this type of Okonite-engineered cable also gives improved circuit regulation because of lower reactance. In addition to its ***dependability***, they value it for ***compactness***—to eliminate congestion, reduce clearance problems, afford a modern, streamlined appearance—and for ***economy***...to save on installation as well as maintenance costs.

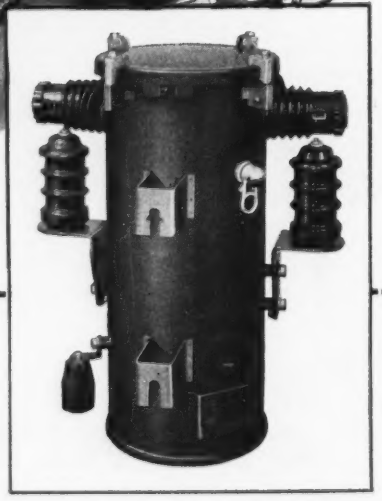
For outdoor or indoor installations, the industrial applications of Okolite-Okoprene Self-Supporting Aerial Cables offer convincing advantages. These are fully described in a 52-page manual available to electrical engineers and company executives. For your copy, send a request on your letterhead to The Okonite Company, Passaic, N. J.

**OKONITE** SINCE 1878

***THE BEST CABLE IS YOUR BEST POLICY***

***insulated wires and cables***

YOU CAN BE SURE.. IF IT'S
Westinghouse



A new line of "CSP" Transformers, with wall-mounted, high-voltage bushings and "De-ion®" arresters. Easier to install, with improved pole clearance. New, extra-strength bushings have large unbreakable "Enrup®" knobs for fast, positive hand-tightening of leads. Convenient location of arresters and brackets facilitates adaptation to wye or delta systems.

*T.M Reg. U. S. Rubber Co.

# *Eliminates 80%*
# of your service calls

Here's how a large midwest utility credits "CSP®" (Completely Self-Protecting) Transformers with greater savings . . . better personnel relations, too, because they alleviated a costly problem:

> "No one liked the necessity of calling out a full crew in the middle of the night to restore service on a conventional transformer because of a simple fuse outage. *'Midnight Nuisance'* is the term we applied. Our linemen used even stronger language.
>
> "Now, 'CSP' Transformers give ample warning of overload conditions. The Emergency Control provides reserve capacity to forestall outages until change-outs are convenient. Since we've standardized on 'CSP' Transformers, we've practically eliminated the *'Midnight Nuisance'*.
>
> "Our line crews prefer their greater freedom from emergency calls . . . and our comptroller appreciates the savings!"

**One sure fact stands out: "CSP" Transformers cut service costs**

Get the full story on how Westinghouse "CSP" Transformers, with built-in lightning and thermal protection, can cut distribution costs for you. Ask your Westinghouse representative for a copy of booklet B-4249-A, or write Westinghouse Electric Corporation, P. O. Box 868, Pittsburgh, 30, Penna.

J-70568

*Plants at Berkeley, Calif.; Sunnyvale, Calif.; Emeryville, Calif.; Los Angeles; Portland; Salt Lake City; Seattle; Denver.*

# CIRCUIT BREAKERS SAVE PRODUCTION TIME

***Circuit breakers*** hold harmless momentary overloads... but trip quickly on shorts. Eliminate needless "down" time.

***Circuit breakers*** can be easily re-set by anyone. No live parts exposed. Nothing burns out... nothing to replace. There's no delay.

***Circuit breakers*** open all lines simultaneously... prevent motor damage due to single phasing.

## THERMAL-Quilless MAGNETIC BREAKER UNITS GIVE 2-WAY PROTECTION

**Thermal** element responds to heating effects of both load current and surrounding atmosphere. Total temperature is limited to a safe value.

**Magnetic** element responds instantly to heavy overloads or shorts. Damage is minimized.

***Both Elements are needed for Complete protection!***

***A Complete Line of Thermal-Quilless Magnetic Circuit Breakers!***

Five frame sizes and four enclosure types—dust-resisting, rain-tight, weatherproof and dust-tight, explosion-resisting.

| | AMPERE RANGE | | | | |
|---|---|---|---|---|---|
| VOLTS | ML | ML 1 | ML 2 | ML 3 | WL |
| 250 | 15-50 | 70-100 | — | 125-225 | 225-600 |
| 600 | — | 15-50 | 70-100 | 125-225 | 225-600 |

***Write*** for Bulletin 600. Address Square D Company, 4335 Valley Blvd., Los Angeles 32, Calif.

ASK YOUR ELECTRICAL DISTRIBUTOR FOR SQUARE D PRODUCTS

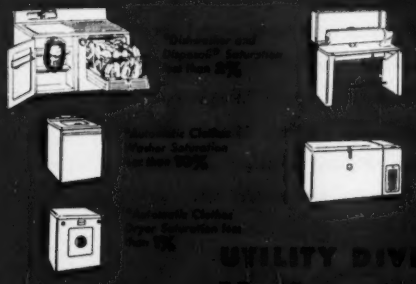
**SQUARE D COMPANY**

DETROIT • MILWAUKEE • LOS ANGELES

SQUARE D COMPANY CANADA LTD., TORONTO • SQUARE D de MEXICO, S.A., MEXICO CITY, D.F.

# Hotpoint's Development of All Major Appliances for Tomorrow's All-Electric Home offers Future Load Insurance for Utilities

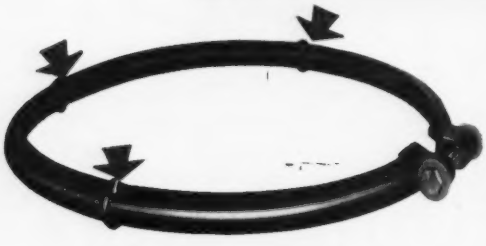
With an eye to the future, Hotpoint's effective promotion of electrical living is creating faster acceptance for major appliances now in the introductory stage. This plus the unprecedented number of today's demand appliances being sold by Hotpoint, offers utilities load insurance for the future . . . when greater load and load balance will be needed.



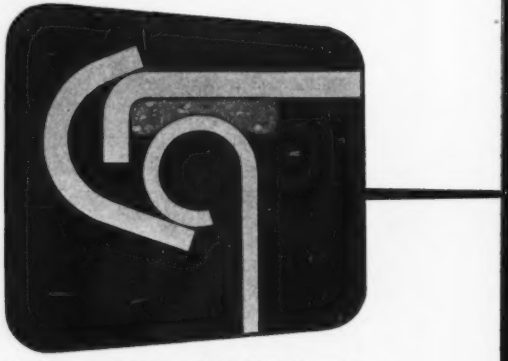
UTILITY DIVISION
Hotpoint Inc.

# NEW Wagner Wagner

## ASSURE SEALED-TANK CONSTRUCTION
## LONGER TRANSFORMER LIFE
## LOWER MAINTENANCE COSTS

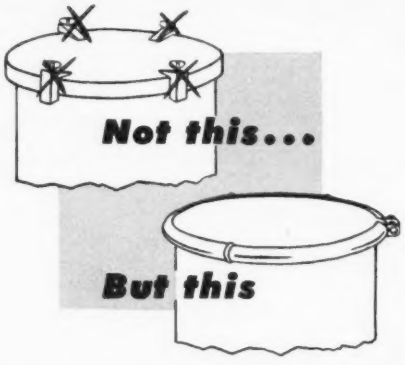


The SHUR-SEAL Clamping Ring has three grooved channels which prevent water from accumulating on the cover.



Here's how the Wagner SHUR-SEAL Clamping Ring securely locks the cover to the tank. Corprene gasket is compressed to assure an air-tight seal.

Wagner Form W Transformers with the exclusive Wagner SHUR-SEAL Cover . . . *plus* Wagner Inhibited Transformer oil assure maximum protection against deterioration produced by "breathing" during the daily load cycle. Loss of oil during shipment or handling is also prevented. The SHUR-SEAL Clamping Ring maintains uniform pressure *around the entire periphery* of the cover—and yet permits easy removal of the cover by loosening a *single* stainless steel bolt. Wagner Form W Transformers offer sealed tank construction, air-tight as a welded tank, but with covers that can be removed if necessary.




The Wagner SHUR-SEAL Clamping Ring maintains *equal* pressure all around the cover.

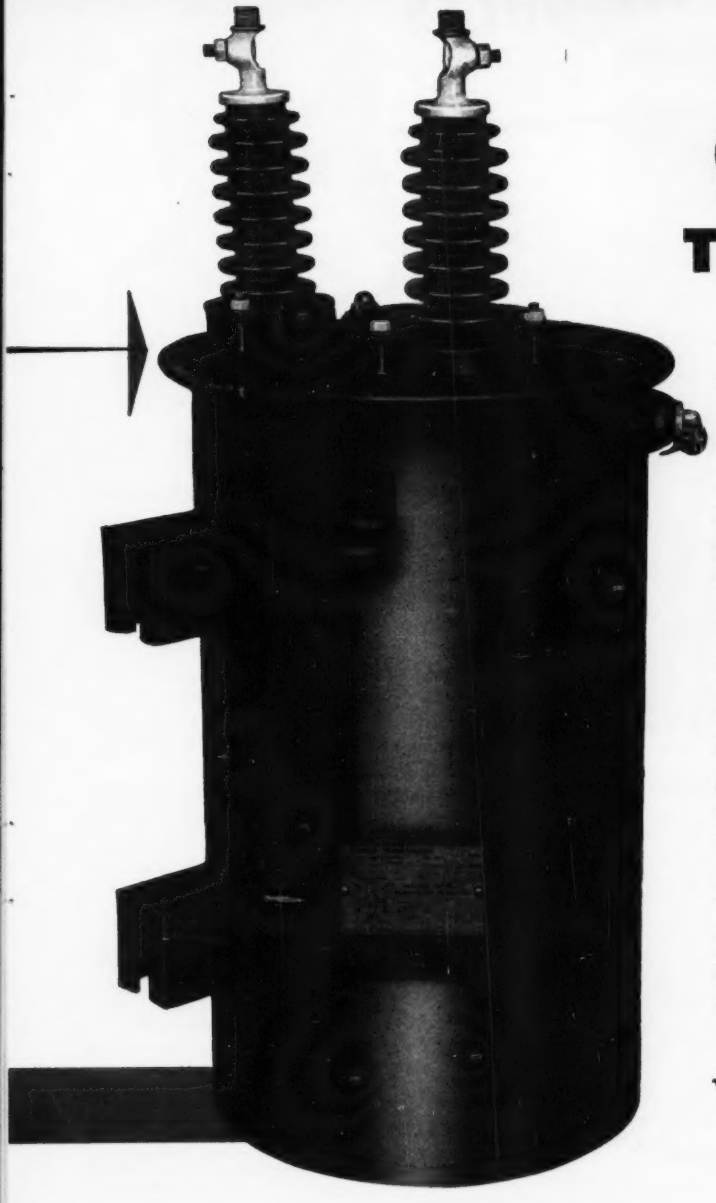
Wagner Electric Corporation
EST. 1891

ELECTRIC MOTORS • TRANSFORMERS • INDUSTRIAL BRAKES
AUTOMOTIVE BRAKE SYSTEMS – AIR AND HYDRAULIC

T51-1

BRANCHES IN 31 PRINCIPAL CITIES

# SHUR-SEAL Cover Inhibited Oil



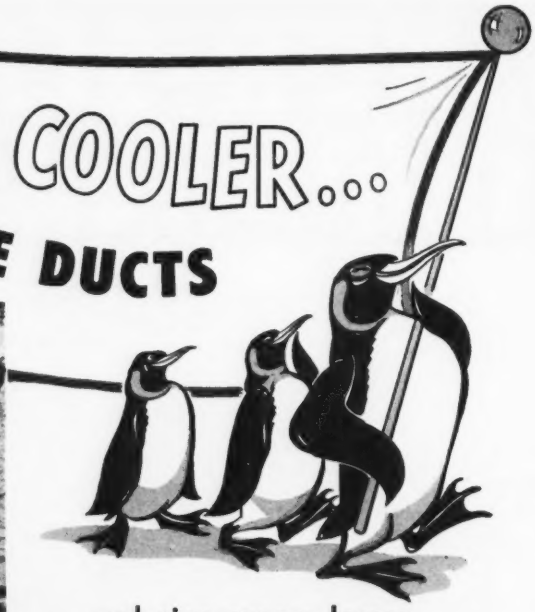
## Wagner Form W Transformers

Wagner Form W Transformers, with preformed cores of cold rolled oriented grain steel, are small in size, light in weight, yet are liberally designed. They are easy to handle, to store, and to mount on poles.

They give you excellent electrical performance . . . core and copper losses are low—regulation at both 100% and 80% PF is good—and exciting current is extremely low. High short time overload capacity provides good peak load performance. Form W Transformers are built to pay dividends in extra service—because they're built the Wagner way—with sixty years of transformer building experience behind them. Why not investigate them today?

**Wagner Electric Corporation**
6381 Plymouth Ave., St. Louis 14, Mo., U. S. A.

# Cables run COOLER...
## in TRANSITE DUCTS



**... reducing copper losses**
**... increasing current capacity**
**... prolonging insulation life**

YOU REDUCE copper losses... increase current carrying capacity... and prolong insulation life, when you run your cables in Transite* Ducts.

Current carrying capacities can be increased in a typical duct bank as much as 5%, or $I^2R$ losses can be reduced 11%, for cables located in Transite as compared with other ducts used for power circuits.

And, Transite Ducts assure permanent duct banks because Transite is incombustible; is immune to rust and rot; is unaffected by electrolysis; will not slag under action of an arc, and will retain its high original strength.

An unusually smooth bore assures no injury to cable sheath, either in natural movement under load or when pulling-in cables. Long, lightweight lengths can be quickly and economically installed. In addition, a full line of fittings simplifies even the most complicated of installations.

For full information on Transite Ducts, write for Data Book DS-410. Johns-Manville, Box 290, New York 16, N. Y.

JM PRODUCTS

*Reg. U. S. Pat. Off.

**How Transite Ducts increase current carrying capacities**

Type cable 3 cdr. 500 MCM Compack Sector, 15 KV (6th Edition AEIC Spec.)
No. of cables—3 (all loaded in one bank)
Daily Load Factor—75%
Earth Temp. ambient—20 C

| | Transite | Other |
|---|---|---|
| Total Therm. Res. to Dielectric Loss (C watts/ft.) | 5.66 | 6.17 |
| Total Therm. Res. to Copper Loss (C watts/ft.) | 4.44 | 4.95 |
| Temp. Rise from Dielectric loss (C) | 1.9 | 2.1 |
| Allowable Rise for Copper loss (C) | 59.1 | 58.9 |
| Allowable Watts per ft. cable | 4.44 | 3.96 |
| Allowable Current—(Amps. per cdr.) | 386. | 365. |
| Allowable Current—(Relative %) | 105.6 | 100. |

**Johns-Manville** *Transite Ducts*

**TRANSITE KORDUCT**—for installation in concrete

**TRANSITE CONDUIT**—for exposed work and installation underground without a concrete encasement

METERING OUTFITS, outdoor — oil filled; Type PCW.

OUTDOOR CURRENT, for accurate heavy duty metering; Type KO — up to 15 kv — 10 to 800 amperes.

INDOOR POTENTIAL, 200 VA, fused or unfused; Type PD — up to 14,400 volts.

INDOOR CURRENT, for heavy duty metering; Type K3E — 15 kv.

INDOOR CURRENT, for low voltage metering; Type KLW — 600 volts.

# Over 400 Ratings

## *FIT MOST DESIGN NEEDS!*

DID YOU KNOW that Allis-Chalmers builds an extremely wide line of *Designer's* transformers?

Whether your need is for instrument transformers, current or potential transformers, or metering outfits, you will profit three ways when you call on the Allis-Chalmers source of supply.

**1. TOP QUALITY** — Uniformly high accuracy . . . liberal reserve thermal capacity are proven characteristics of Allis-Chalmers instrument transformers.

**2. GOOD DELIVERY . . . CERTIFIED SERVICE** — There are A-C Sales Offices, Authorized Dealers, warehouses, and Certified Service Shops throughout the nation. Immediate shipment on many popular ratings and sizes.

**3. WIDE SELECTION** — The Allis-Chalmers standard line fills practically every power need . . . special designs built to meet unusual applications.

For Details call your nearby Allis-Chalmers Sales Office or send coupon.

**ALLIS-CHALMERS**

Allis-Chalmers
Milwaukee 1, Wis.

Please send new 32 page Bulletin 6187168, listing types, ratings, applications and prices of Allis-Chalmers Instrument Transformers.

Name .....

Title .....

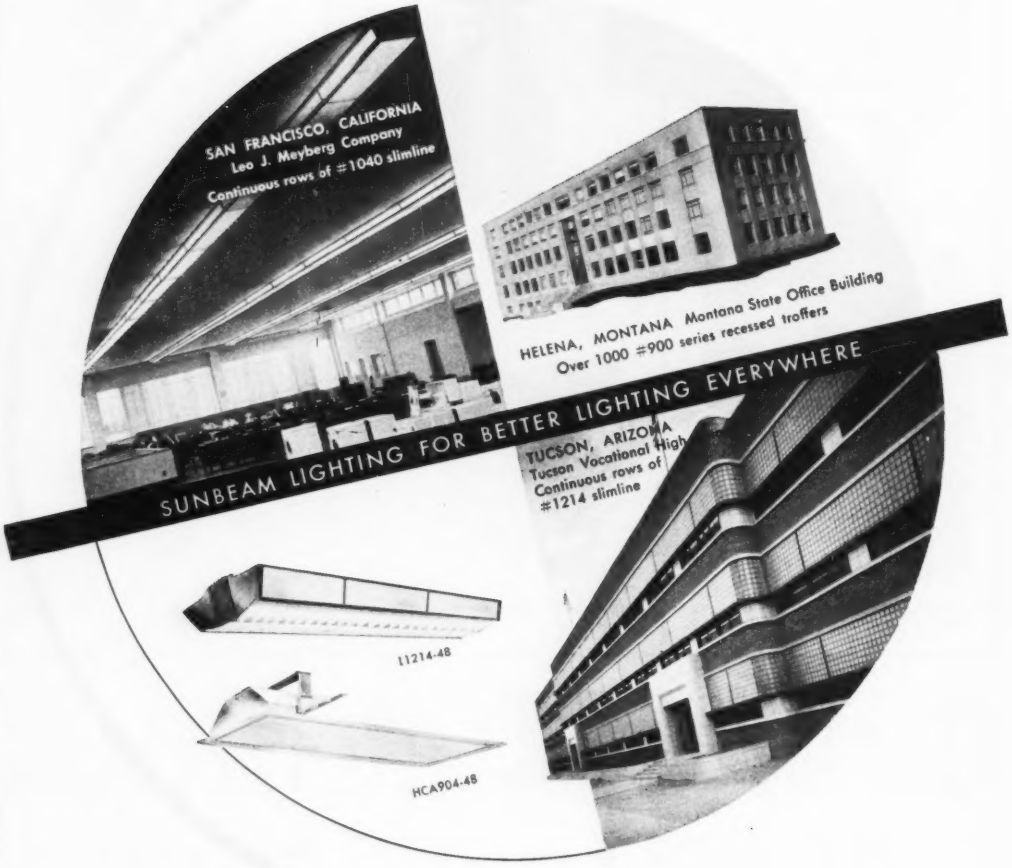
Firm .....

Address .....

City ..... State .....

A-3132

SOLD AND APPLIED BY AUTHORIZED DEALERS, AND DISTRICT OFFICES THROUGHOUT U. S., SERVICED BY CERTIFIED A-C SERVICE SHOPS




Your assurance of the best lighting anywhere is to specify Sunbeam fluorescent or slimline fixtures. This gives you the advantage of one of the largest selections of modern fixtures to choose from. Whether the lighting plan calls for general illumination or specific types of light distribution for critical visual tasks, Sunbeam has the scientifically designed luminaire to meet your need. See your leading electrical distributor for complete information.

SUNBEAM visionaire LIGHTING COMPANY

**SUNBEAM LIGHTING COMPANY**

777 EAST 14TH PLACE • LOS ANGELES 21, CALIF.

# I'm an "inhibited" character!

## ...and that's good!

**BECAUSE** "Inhibitol", my inhibited transformer oil, satisfactorily performs its functions far longer without maintenance than any non-inhibited transformer oil. This is the result of the action of an inhibitor which retards

**(1) oxidation,**
**(2) acid formation which attacks insulation, and**
**(3) formation of sludge which slows heat transfer**

Add this to my advanced design, which guarantees superior performance even *without* "Inhibitol", and you'll know why I say, "It's good to be an inhibited character" . . . *and at no extra cost!*

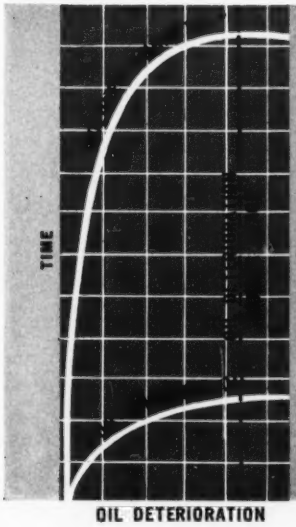
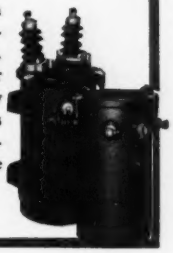



**Chart shows result of comparative test of non-inhibited transformer oil and Moloney "Inhibitol". The greater resistance to deterioration obtained with "Inhibitol" results from the use of an inhibitor. The ability of the transformer to resist electrical failure is maintained at a high level for a greater length of time than is obtainable with any non-inhibited transformer oil.**

## *ALSO "VINYLTEX"...*

**In case you haven't noticed, I'm looking better these days. That's because I'm now covered with baked-on "Vinyltex", the remarkable new vinyl base paint. This is now standard, *at no extra cost either,* to protect me from scratching, scraping or chipping. And as for weather resistance... why "Vinyltex" rivals porcelain in durability, yet is flexible and not brittle.**



*Send for Bulletin H-305*

**MOLONEY ELECTRIC COMPANY**

*Sales offices in all principal cities*

FACTORIES AT ST. LOUIS, MISSOURI AND TORONTO, ONTARIO, CANADA

# Be Sure It's...

Rome RoFlex is Underwriters' Laboratories approved for 600 volts. Available in 2 and 3 conductor sizes, with or without ground wire. Packaged for convenience of handling in individual cartons. Order it from your electrical wholesaler today.

# Rome RoFlex NON-METALLIC SHEATHED CABLE

# With New GRAY FINISH

## SURFACE MARKED FOR EASY IDENTIFICATION

Here is the answer to an electrican's prayer . . . a non-metallic sheathed cable with a finish that is smooth for easy pulling, clean to handle, non-flaking and clearly printed with size and name for easy identification. Yes, Rome's new gray finish is an improvement you *cannot afford to pass up.* There is no need to wear safety goggles when you work overhead with the new RoFlex. Its finish will not flake or dust off . . . does not get tacky . . . leaves you with clean hands.

Under the new gray finish, Rome RoFlex has the same high quality construction as before. It is easy to strip, smaller in diameter and light in weight. Its outer braid is a combination of glass and presaturated yarn for high resistance to mold and rot.

On your next "flex" job save time and money by insisting upon the new Rome RoFlex with the *gray finish.*

***IT COSTS LESS TO BUY THE BEST***

## ELECTRICAL WHOLESALERS:

These Rome Cable Products Mean *Extra* Business for You

**Special Wholesalers Packaged Weatherproof Wire**

Here is a special 500' carton package of Weatherproof for handy contractor use. If you are not pushing this item, you are missing a fast seller. Originated by Rome for small outdoor jobs, this convenient package eliminates wastes and cuts costs. Available in sizes 4 to 14 AWG, soft and medium hard.

**RoMarine-RoPrene—Type USE, Style RR**

This economical and all-resistant power cable can be a sales leader. Neoprene sheathed, it resists acids, oils, moisture and flame. Ideal for industrials, utilities, residential and farm jobs, airport lighting and outdoor theaters. Underwriters' approved as Type USE for underground services.

### Why it Pays to Sell Rome Cable Products

Rome Cable recognizes the electrical wholesaler as the logical distributor of its products and has always maintained a strict wholesaler policy.

Rome Cable advertises aggressively on a national scale. Its products are well known.

Rome Cable service is dependable with well stocked warehouses strategically located.

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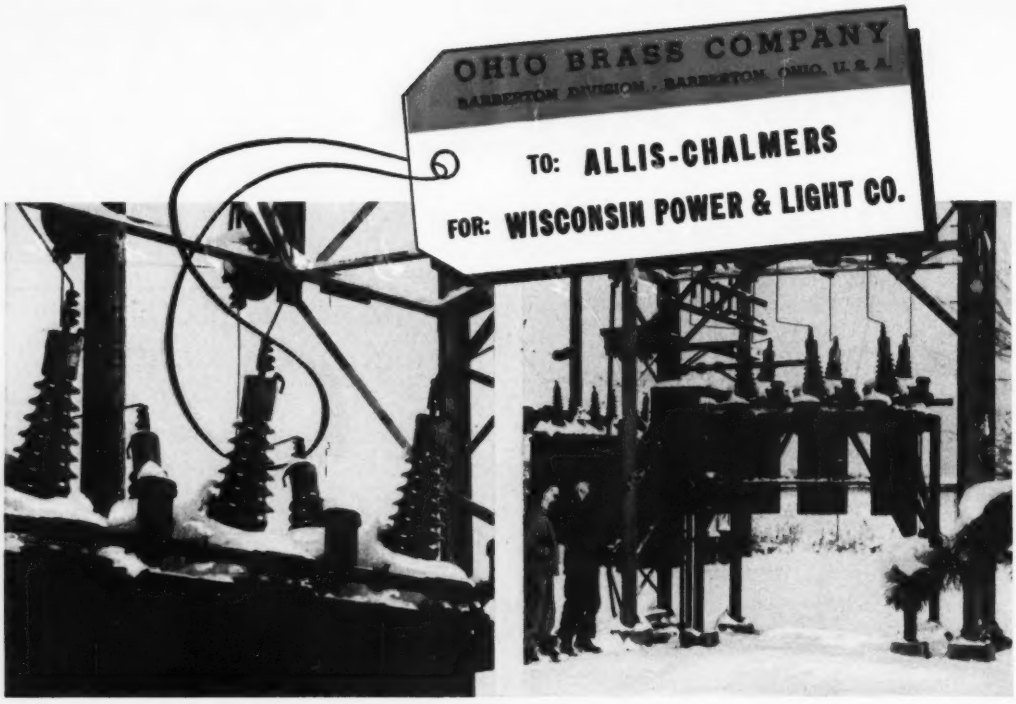
3404 Fourth Ave., So.




# UPHOLDING A TROUBLE-FREE RECORD . . .

## *After 10 Years of Heavy-Duty Breaker Operation*

In the Stoughton substation of the Wisconsin Power and Light Company, these Allis-Chalmers Power Oil Circuit Breakers are still completely free from trouble after ten years of heavy duty service. As stated by A-C, "--they hold an unbroken record of 100% dependability in meeting the severe operating requirements imposed upon them from the time of their installation, June, 1940. Designed and built to supply vital electrical protection on power systems, oil circuit breakers like these will interrupt short circuits or normal load currents. With this kind of double-duty, the extra large design factor of safety built into every A-C circuit breaker pays dividends."

Both insulation and mechanical support of contacts depends upon the O-B bushings which were furnished by Allis-Chalmers as original equipment and, for over 10 years, both the breakers and O-B bushings have been free from all trouble. To insure the basic goodness of good apparatus, be guided by this performance and specify---

*Ohio Brass*

**O-B BUSHINGS . . .**
**AN ESSENTIAL PART OF**
**ANY OIL CIRCUIT BREAKER**

MANSFIELD • OHIO

3086-H

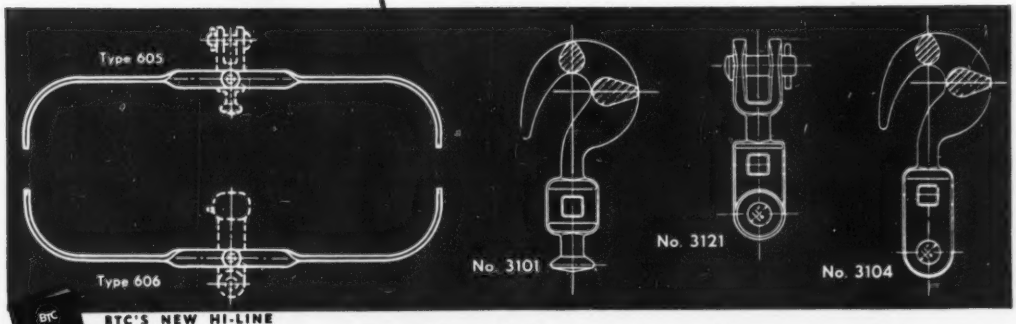
# BTC ...THE COMPLETE LINE

## Arcing Horns & Support Fittings

**The use of Simple Flat or Round Steel Arcing Horns is an economical method of minimizing danger of flash-over damage to conductor and insulator string.**

**Standard Arcing Horns** including the easily-applied Single-Bolt Type as well as Drop Forged Steel Fittings for their attachment on Ball Socket and Clevis Type Insulator Strings, are part of **BTC'S COMPLETE LINE.** Full information will be found in the new BTC Hi-Line Catalog Number 6, which can be secured on request.

**Special Arcing Horns and Rings.** . . . BTC is prepared to design and produce special Curled-End or Spherical-Tipped Horns, as well as Arcing Rings made from flat, round, structural or tubular steel. Drop Forged Steel Fittings for their support also can be provided. Dies and tools are available for several special designs . . . your inquiry is invited.

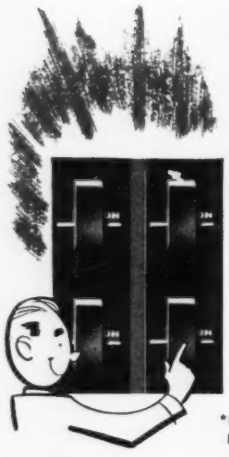


**BTC'S NEW HI-LINE CATALOG,** showing its complete line of transmission line hardware, is available on request. Write for your copy today.

*Sold Through Your Insulator Manufacturer Only*

**THE BREWER-TITCHENER CORPORATION, Cortland, N. Y.**

# Simplest switching with Pushmatic* ELECTRI-CENTERS



Push—it's ON!

Push—it's OFF!

Push—it's ON again!

*Push-button switch with automatic protection for electric circuits

NOTHING could be simpler! A simple push of the finger switches the current either ON or OFF.

If Pushmatic is automatically tripped by short or overload, just push and service is restored. No bothersome resetting by hand . . . no fuses to buy.

And simple push-button switching is just one of the many exclusives that make Pushmatic Electri-Centers first for circuit control and protection. Pushmatics offer flexibility never before obtainable in any panelboard!

**All units interchangeable!**

All Pushmatics are identical in size and contour, regardless of rating or type. That means each unit can be quickly inserted, removed or interchanged without disturbing other units. Handle ties quickly convert two horizontally adjacent single-pole Pushmatics into two-pole branches.

Surest protection is another Pushmatic feature. Approved by Underwriters' Laboratories, quick-break Pushmatics operate with split-second precision when short or overload occurs. Automatic tripping is entirely independent of manual operation.

There's a Pushmatic to meet every load condition: THERMAL-MAGNETIC, or THERMAL-MAGNETIC with *exclusive* AMBIENT COMPENSATING FEATURES. They're rated at 15, 20, 30, 40 and 50 amperes, 1 pole, 120 V., or 2 poles, 120-240 V., AC.

For simplest switching, most flexibility, surest protection and fastest delivery, change to Pushmatic Electri-Centers for every panelboard job!

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**BULLDOG**

**PIONEERS IN FLEXIBLE ELECTRICAL DISTRIBUTION SYSTEMS**

## New plan for fastest delivery!

*1* Here's insurance for rush jobs! You're prepared for any order with a small supply of basic Electri-Centers and fronts plus . . .

*2* several cartons of flexible, interchangeable Pushmatics, supplied by your local distributor. Here's how this small investment pays off:

*3* When you have a hurry-up job, simply pick out the basic Electri-Center needed, hook Pushmatics on the mounting rib and connect them to bus bars with a screw driver.

*4* No time wasted tracking down supplies! When time counts, you're prepared for any panelboard job with this small supply of flexible Pushmatic Electri-Centers!

**CONSULT THE FOLLOWING PACIFIC COAST REPRESENTATIVES**

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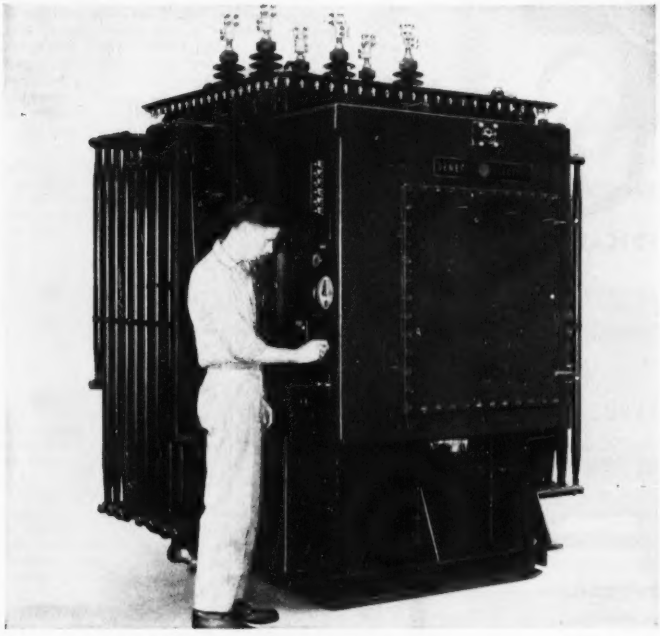
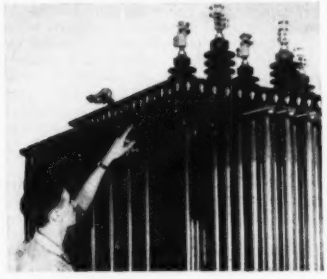
# NEW STATION-TYPE VOLTAGE REGULATOR

**Requires less maintenance** **Is easier to inspect**



**Now up to 2500 kva** in standard ratings. Voltages up to 69,000 volts, 3-phase. 10% raise and 10% lower in 32 equal steps.



### Added Oil Life

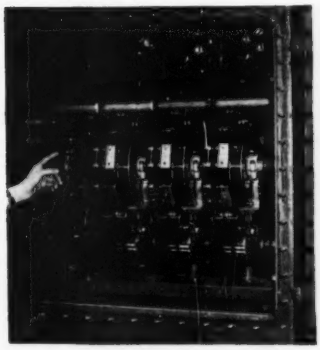
Main tank now completely sealed with Nitrile rubber gaskets. Protects oil from oxidation, sludging, and moisture.

**New MLT32 Step Voltage Regulator** is now in production. Shipments are short. New design means even lower maintenance, more convenient inspection, easier testing—plus accurate, dependable voltage regulation.

New bulletin, GEC-716, gives full particulars. Secure a copy from your nearest G-E Apparatus Sales Office, or write Apparatus Dept., General Electric Co., Schenectady 5, N. Y.

### Redesigned Control Panel Includes

- New simplified voltage-regulating relay with fixed holding coil adjustment.
- New test rheostat for convenient voltage-level adjustment.
- New current-testing terminals.
- New reversing switch for reactance element of line-drop compensator.
- New larger, easier-to-read position indicator.
- A handy utility shelf for instrument.



### Switch Compartment More Accessible

Large hinged door permits much easier inspection and servicing of an improved switching mechanism.

**Time-tested Geneva-Gear Drive** meets exacting requirements of shockless, quick-break action, accurate positioning of the contacts throughout the switching cycle, and firm locking on each position without latches or brakes.

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# ELECTRICAL BOOKS

TRANSIENT PERFORMANCES OF ELECTRICAL POWER SYSTEMS, by Reinhold Rüdenberg, 832 pages, 6x9, McGraw-Hill Book Co., $12. An enlarged edition in English of this classic German text. The book tends to develop a survey on the entire field of transients in lumped power circuits. Many numerical examples, taken from actual practice, are worked into the text. The numerous oscillograms and measurements throughout may further bridge the gap between the theory and the practice of the transients.

SURVEY OF MODERN ELECTRONICS, by Paul G. Andres, 522 pages, 6x9, John Wiley & Sons, $5.75. The volume explains the fundamentals of electronics and provides a summary of applications. The fundamentals and technical details are correlated very closely with their application in industry. The treatment is descriptive rather than mathematical. The vital importance of electronics in nearly all branches of science and engineering is demonstrated. Basic principles of the construction, operation, and use of electron tubes are covered.

FREQUENCY MODULATION, by K. R. Sturley, 98 pages, 6x9, Chemical Publishing Co. Inc., $4.75. Radio technicians will find in this book the principles of frequency and phase modulated systems. The advantages and disadvantages of frequency and phase modulated transmission over amplitude modulation, the modulating methods and the various details of the frequency modulation receiver are discussed in simple and clear terms. Adequate treatment is given the problems encountered in the design of frequency modulation receivers.

DESIGN OF ELECTRICAL APPARATUS, third edition, by John H. Kuhlmann, 512 pages, 6x9, John Wiley & Sons, $6.50. The third edition presents practical methods for designing the important types of electrical apparatus—d-c generators and motors, a-c generators and synchronous motors, induction motors and transformers. A sound theoretical background, as well as a practical treatment of each of the machines considered, is given. There are numerous changes in the third edition, bringing this important text up to date in every respect in the field of apparatus design.

ELECTROMAGNETIC THEORY, by Oliver Heaviside, 386 pages, 9x12, Dover Publications Inc., New York, $7.50. This classic of modern applied science is now made available in an unabridged one-volume edition. Despite the fact that the three original volumes published between 1891 and 1912 contained a total of about 1,500 pages, this new one-volume addition is unabridged. Everything relating to electrical induction—the energy of electric currents, the forces and fluxes of energy in the magnetic field—Heaviside worked out in careful detail. Included also is Maxwell's theory, colotropic relations, the electrostatic stress of air, depth of electrified layer on a conductor; waves from moving sources, waves in the ether, sound waves and electromagnetics. Electromagnetic Theory is more in demand today than many a contemporary work on modern scientific technique.

YOU CAN BE SURE.. IF IT'S
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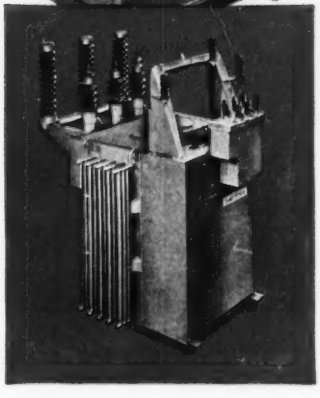

The JUNIOR "CSP"
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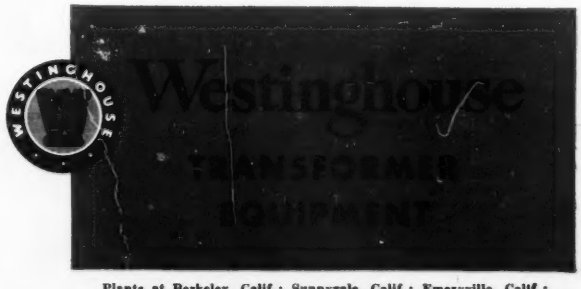
NEW ECONOMY
... for small capacity substations

Here's the substation that fills a long apparent need in the power distribution field . . . a smaller, yet complete, substation with integral high and low-voltage switchgear as well as metering equipment. And what's more, it's "CSP" (Completely Self-Protecting), with both thermal and lightning protection built in.

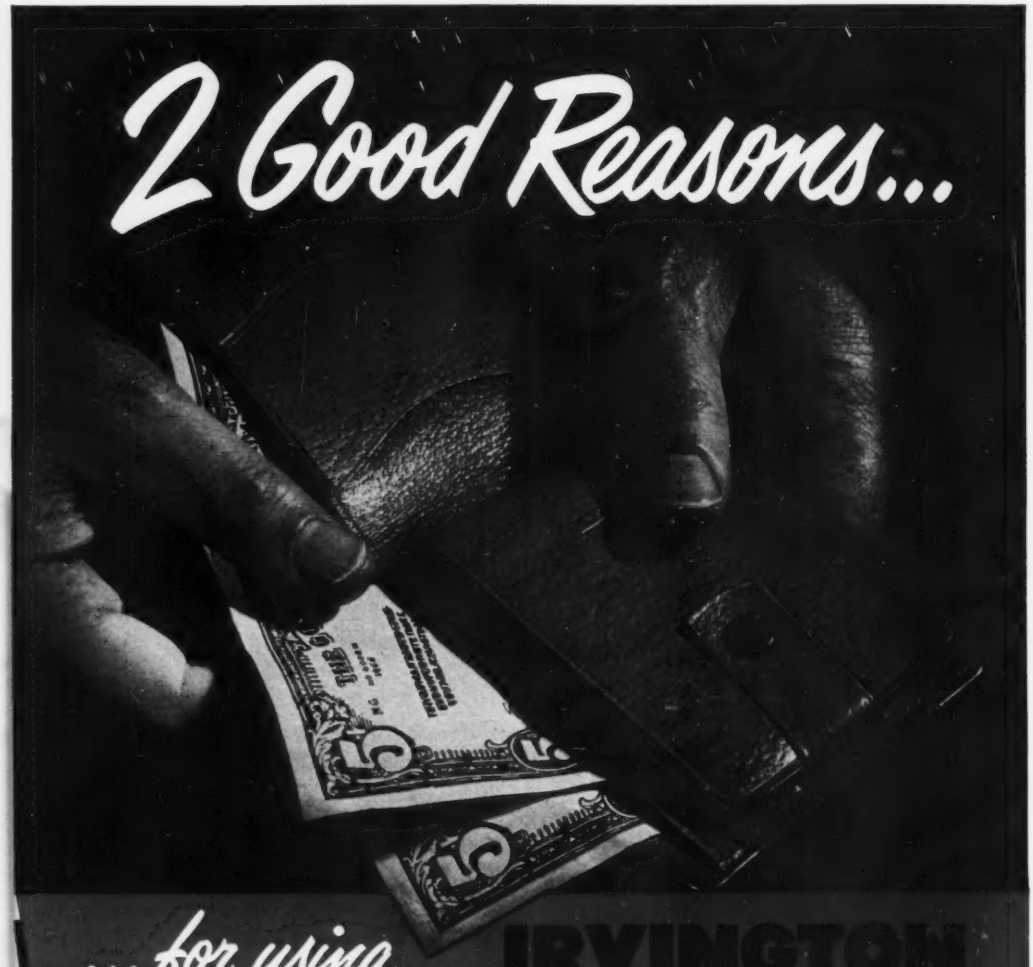
Designed for small towns and similar areas where the capacity of the feeder does not justify a larger rated "CSP" Power Transformer, the new "CSP" JUNIOR provides all the advantages of compactness, simplicity and ease of operation . . . PLUS *low cost.*

Available in 300 to 1000-kva ratings. For further information on all ratings of "CSP" Power Transformers, contact your Westinghouse representative, or write for Booklet B-4692. Westinghouse Electric Corporation, P. O. Box 868, Pittsburgh 30, Pennsylvania, J-70572-A




Plants at Berkeley, Calif.; Sunnyvale, Calif.; Emeryville, Calif.; Los Angeles; Portland; Salt Lake City; Seattle; Denver.

# 2 Good Reasons...



...for using IRVINGTON #32 RED INSULATING ENAMEL

**1** **It saves money** *because it costs less!*

**2** **It saves money** *because it dries fast!*

*Look to Irvington* for insulation leadership

Now you can save time, save money, on every electrical finish-enamel job. With Irvington's new #32 Red Oilproof Insulating Enamel, you get new speed of drying, new low cost. And you also get the bonus protection of a tough, impervious, 800 volt-per-mil insulation. Write today for technical data and samples.

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# More Restorations Fewer Lockouts

## *with* PACIFIC's Type AP-40 Motor-Rewound SERVICE RESTORER

**For Selective Protection of Three-Phase Suburban and Rural Lines —and Light Industrial Loads**

### RATINGS

14.4 kv, to 100 continuous amp, to 200 tripping amp; interrupting amp is 40 times continuous amp, to 2000 amp. Up to 3 reclosures, with various combinations of instantaneous and inverse-time-delay tripping.

Tripping amp may be as low as continuous amp. Relay and remote-control accessories also available.

PACIFIC'S Type AP-40 Service Restorer embodies unique features that aid in increasing the number of restorations—with corresponding reduction of branch outages and lockouts—for most any probable random occurrence of faults on circuits of the kind ordinarily protected by reclosers.

One of these features is that time-delay reclosing may be from 10 to 30 seconds, adjustable. This permits extended-time transient faults to clear before lockout or branch loss otherwise would occur. In some cases the effort to restore service may continue for as long as two minutes!

And because the first reclosing interval may be as short as 12 cycles, the quality of service to the unfaulted branches is also greatly improved.

Space does not permit more than these few hints that the Type AP-40 provides exceptional protective performance—which is why we name it a Restorer instead of a recloser. Catalog No. 840 tells the story . . . yours for the asking.

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**PACIFIC ELECTRIC MFG. CORPORATION**

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Approved by UNDERWRITERS LABORATORIES

# YES, the PENN-UNION Connector TAKES THEM ALL-

## LARGER SURFACES for the WRENCHES ~ a good-sized HEX Top and Bottom

**The men who use connectors** appreciate the *better design* of the Penn-Union - - especially when they have to make a splice in close quarters, or any unhandy location.

**Better Design** is a feature of the entire Penn-Union line, which includes Tees and Taps, Straight Connectors, Terminals, Grounding Clamps, and many more fittings . . . every one thoroughly dependable, mechanically and electrically. *Preferred by leading users,* who have found that "Penn-Union" on a fitting is their best guarantee of unfailing service.

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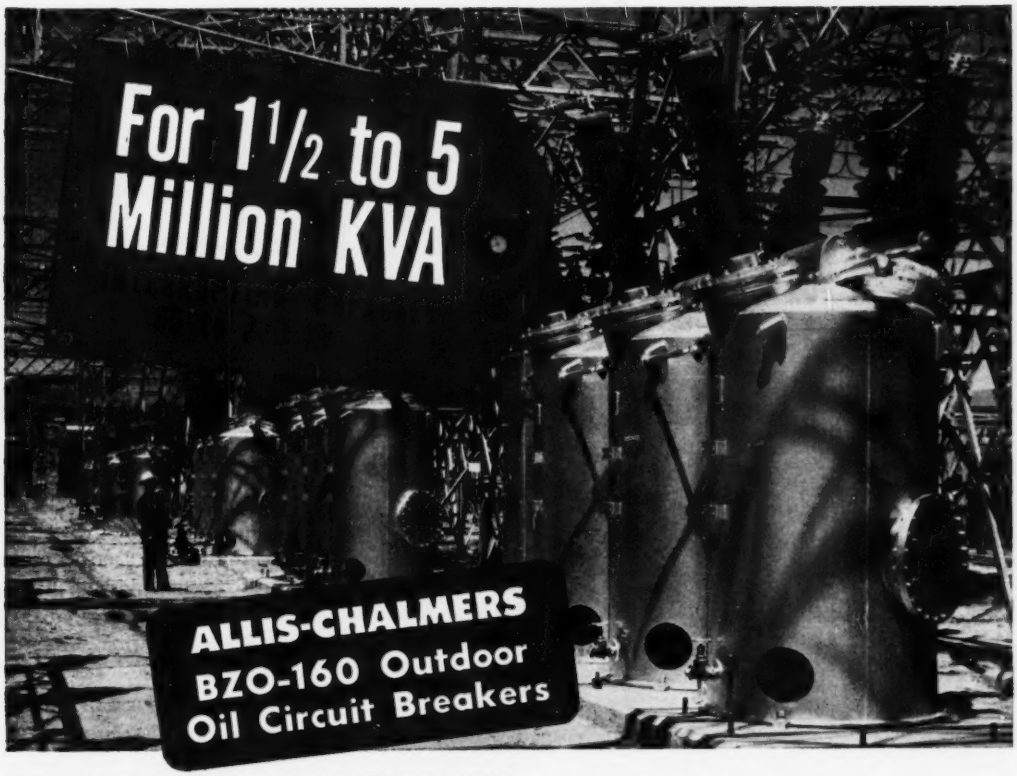
*The Complete Line of Conductor Fittings*

**PENN-UNION**




**MECHANICALLY TRIP-FREE OPERATOR** *affords high-speed opening*

**RELIABLE HIGH SPEED FAULT CLEARING AND FAST RECLOSING** *for system needs*

**EVERY BREAKER COMPLETELY FACTORY ASSEMBLED AND TESTED** *before shipping*

MAINTAIN continuity of power service despite transient line faults. The BZO-160 oil circuit breaker clears system faults in 3 to 5 cycles and recloses within 20 cycles to give you protection in ratings 69 kv and higher. Get long-life performance and reliable protection with these BZO-160 features:

1) Mechanically trip-free design gives high-speed contact opening under all operating conditions. Pneumatic operator is uncoupled from the contact mechanism through a positive mechanical linkage. This means that contacts open independent of closing piston position.

2) *Ruptor* interrupter gives split-second arc extinction . . . interrupts load and fault currents with low arc energy release. Reduces oil and contact deterioration to a minimum. Arc resistant alloy contact tips give long contact life with little maintenance.

The BZO-160 performance is based upon more than 50 years of circuit breaker design and manufacturing experience, exacting laboratory and field tests, and years of power service. Simple breaker construction, free of complicated mechanisms, makes inspection easy.

For more information on dependable BZO-160 performance call your A-C sales office or write for new bulletin 71B6022C. A-3074

**ALLIS-CHALMERS, 939A SO. 70 ST. MILWAUKEE, WIS.**

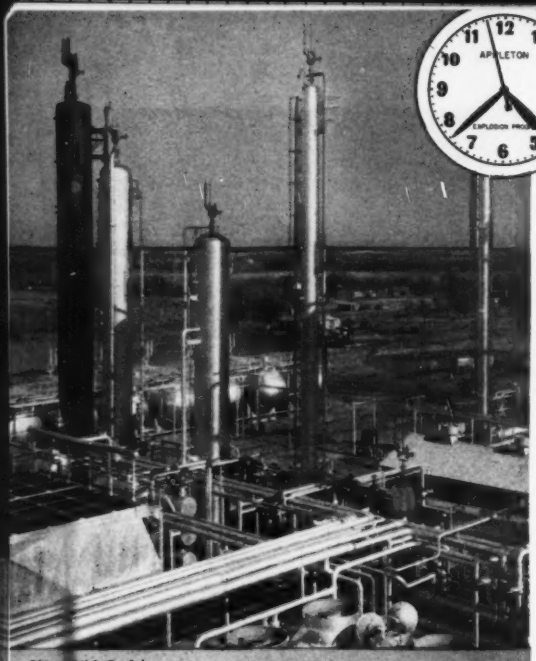
**STANDARD RATINGS**

| Rated KV | Rated Amp. 60 cycle | KVA Interrupting Capacity* |
|---|---|---|
| 69 | 1200 | 2,500,000 |
| 69 | 2000 | 3,500,000 |
| 115 | 800 | 1,500,000 |
| 115 | 1200 | 3,500,000 |
| 138 | 800 | 1,500,000 |
| 138 | 1200 | 3,500,000 |
| 138 | 1200 | 5,000,000 |
| 161 | 800 | 3,500,000 |
| 161 | 800 | 5,000,000 |
| 230/196 | 800 | 3,500,000 |
| 230/196 | 800 | 5,000,000 |
| 230 | 800 | 3,500,000 |
| 230 | 800 | 5,000,000 |

*For information on higher interrupting ratings, get in touch with your A-C sales office.

*Ruptor* is an Allis-Chalmers trademark.

**ALLIS-CHALMERS**




*Photo—Oil & Gas Jnl.*

*'round-the-clock*

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## EXPLOSION-PROOF EQUIPMENT

Here are conduit fittings and lighting fixtures designed to provide day-and-night protection against the arcs that touch off disastrous fires and explosions in chemical plants, oil refineries, hospital surgeries—wherever explosive or flammable vapors, dusts or gases are present.

Engineered to completely confine the dangerous sparks that lurk in wiring systems, Appleton Explosion-Proof equipment is easy to install and service. And among the hundreds of fittings and fixtures in the complete Appleton Line is an explosion-proof fitting exactly suited to your needs.

Any wiring or lighting job—explosion-proof or otherwise—is a better job when Appleton fittings and fixtures are used. For the better electrical equipment that means better building, specify Appleton, supplier to American builders for nearly half a century.

New Vented Type EVX Explosion-Proof Lighting Fixture. Available for 60, 100, 150, 200, 300 and 500 Watt Lamps.
Pat. No. 2,530,135

The Appleton Seal-Line Switch Unilet is a combination switch housing and sealing unit. Completely explosion-proof without additional sealing fittings.
Pat. No. 2,208,558

Type FSQX Explosion-Proof and Dust-Tight plug and Receptacle with interlocking safety switch.

THE EFU—First and still finest fluorescent explosion-proof lighting fixture. Available for two 40 watt 48" lamps or two 100 watt 60" lamps.
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# APPLETON

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FOR BETTER ELECTRICAL INSTALLATIONS

# 5 NE WIDE RANGE CONNECTORS

*are all you need*

For Wire and Cable Sizes 14 AWG to 500 MCM

100% COPPER FOR CONDUCTIVITY

STEEL FOR PRESSURE

**Entire Unit Cadmium plated—for copper, aluminum or steel conductors**

LISTED BY UNDERWRITERS' LABORATORIES, INC.

| Catalog Number | Cable Size Range | |
|---|---|---|
| | Minimum | Maximum |
| NE 35 | 14 Sol. | 8 Str. |
| NE 60 | 8 Sol. | 2 Str. |
| NE 100 | 2 Str. | 1/0 |
| NE 200 | 2/0 | 4/0 |
| NE 400 | 250 MCM | 500 MCM |

- **Positive Grip Action**—Screw pressure on contact pad perfects pressure contact—is self-locking—increases "pull out" resistance.
- **Low Temperature Rise**—High pressure and wide contact area provide electrical conductivity greater than that of the maximum size wire or cable the connector will take.
- **Economical**—"Wide Range" provides for maximum usage, low inventory—completely salvable—one-piece assembly.

**Write for our folder giving dimensional details, catalog numbers and other helpful information on National Electric "Wide Range" Connectors.**

EVERYTHING IN WIRING POINTS TO

**National Electric**
**PRODUCTS CORPORATION**
PITTSBURGH, PA.

National Electric Products Corporation
1308 Chamber of Commerce Building
Pittsburgh 19, Pennsylvania

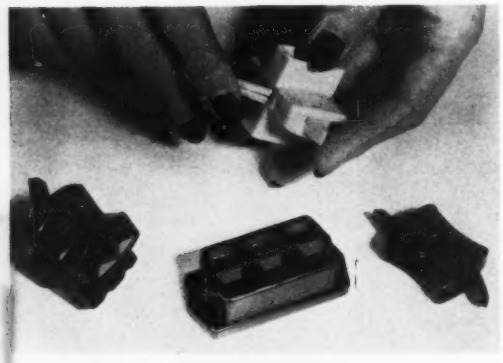
Please send me your FREE folder "*Wide Range* Connectors for Better Electrical Installations."

Name_____

Company_____

Address_____

# PRODUCT NEWS



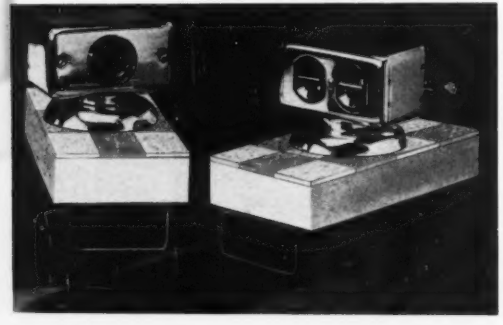
## Wiring Devices Added

*(1) Monowatt Inc., Providence 7, R. I.*

Three items have been added to the Quick Clamp line—a triple tap, flat tap and cord splicer. This line features a three-step procedure for wiring devices. The cord is cut off square and slit; then is inserted into the side of the device and the clamp pressed shut. Internal contacts pierce the insulation of the cord and make the contact.

The new cord splicer does away with unsightly splices and the necessity of stripping insulation, twisting wires and tapping.

These items are for use with any standard No. 18, 2-conductor rubber, plastic or rayon-covered parallel cord; are Underwriters' approved.



## Service Fittings

*(2) National Electric Products Corp., Chamber of Commerce Bldg., Pittsburgh 19, Pa.*

Two new service fittings for high- and low-potential wiring are designed for use with underfloor wiring systems. Innovations include a height of only 3 in. from floor to top of fitting; improved design; chrome finish.

Fitting No. 7903-H has standard duplex T-slot receptacles for use with high-potential light, power or office appliance wiring. No. 7904-HL has a single ¾-in. composition bushing for telephone, buzzer and intercommunication wiring in plant offices and office buildings. Both models are equipped with 1-in. nipple to give ample capacity from the duct into the service fitting. A bondnut locks the housing to the nipple.

Adapters to screw into standard 1½-in. outlets of underfloor wiring distribution systems are furnished with both models. Model 7903-H can be furnished with 3-pole twist-lock receptacles.

## Multibreakers for Outdoor Use

*(3) Square D Co., 6060 Rivard St., Detroit 11, Mich.*

A complete line of multibreakers extending from 1 through 20 circuits are Underwriters' approved as raintight (NEMA type 3) for outdoor use. The enclosures are formed and welded galvannealed steel. Couduit hubs are furnished in a variety of sizes in the top and all knockouts in the sides, bottom and back are below the lowest electrical part. Bottom or side hubs are therefore unnecessary.

Features include: thermal-magnetic operating mechanism combining advantages of thermal and magnetic tripping elements; positive protection against dangerous overloads and instantaneous action on shorts; elimination of useless tripping on harmless momentary overloads; they give repeat protection; are non-tamperable; are trip-free; have dead front construction with no live parts exposed.

The basic multibreaker is arranged in ad-on and plug-in types, giving flexibility. Similar multibreakers are available for indoor use in combinations from 1 through 42 circuits.

**For Additional Information**
**Fill in the Postcards on Page 43**

YOU CAN BE SURE.. IF IT'S
Westinghouse

# USEFUL LIFE OF WEMCO C TRANSFORMER OIL INCREASED THREE TIMES

## Inhibitor Added

Greater freedom from oil maintenance problems! Development of a new inhibiting agent, and its addition to WEMCO C Transformer Oil, has resulted in greatly increased service life.

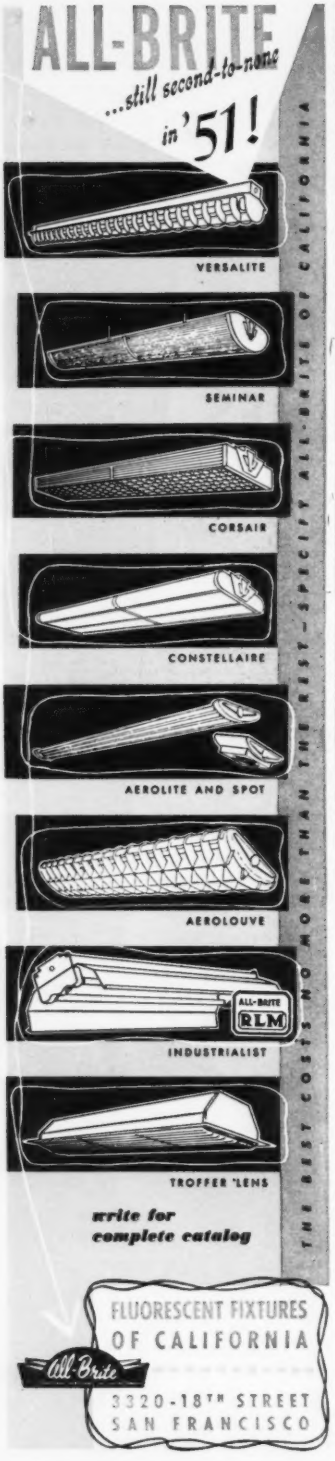
All the advantages of standard WEMCO C are maintained: low viscosity . . . freedom from acids, alkali, and corrosive sulphur . . . resistance to emulsification . . . freedom from sludging for long (now even longer) periods of service. *Inhibited WEMCO C* now maintains all these properties *three times longer!*

Now supplied as standard in all Westinghouse Distribution Transformers (both "CSP"® and conventional), *Inhibited WEMCO C* will shortly be standard in Westinghouse Power Transformers and will also be available for replacement use. For further information, contact your Westinghouse representative or write Westinghouse Electric Corporation, P. O. Box 868, Pittsburgh 30, Pennsylvania.

J-70575

Westinghouse
DISTRIBUTION TRANSFORMERS

*Plants at Berkeley, Calif.; Sunnyvale, Calif.; Emeryville, Calif.; Los Angeles; Portland; Salt Lake City; Seattle; Denver.*




## Transformer Redesigned

*(4) Allis-Chalmers Mfg. Co., 939 S. 70th St., Milwaukee, Wis.*

Design changes in the manufacturer's single and 2-bushing potential transformer (type SPW) have reduced weights up to 60% in some ratings and have decreased dimensions by one-third.

The redesigned model has a completely welded heavy-gage steel case, resulting in a hermetically sealed unit free from breathing.

Core of the transformer is of high-permeability cold-rolled steel to give a lighter and smaller unit with high accuracy, the manufacturer states. Electrical coils are protected by corona-free preformed angles, channels and barriers of insulating material for high impulse strength. The assembly is thoroughly dried and liquid filled under vacuum. Large cooling ducts allow free oil circulation and high thermal rating.

These potential transformers are available in the 500-va., 60-cycle, oil-filled class in 24-, 34.5-, 46- and 69-kv. ratings.

## Earth Augur

*(5) Petersen Engineering Co., 4126 26th St., San Francisco.*

A twin-helix augur, the Pengo, made to fit the manufacturer's highway earth boring machine is also for use with all popular makes of power driven earth boring machines by means of adapters. The augurs are made in nine sizes for hole diameters to 36 in.

## Ground Operated Control Device

*(6) Westinghouse Electric Corp., Box 2029, Pittsburgh 30, Pa.*

A control device for operating the breaker reset handle of pole-mounted CSP transformers from ground level is claimed to be especially useful for turning on and off sports lighting or for other special applications where power is supplied by CSP transformers.

Two control cables are attached to a special bracket mounted on the breaker handle. These run down the pole in circuit and terminate in a control box mounted on the pole at a convenient height above ground. Strain insulators eliminate possibilities of voltage in the control box. Handles plainly marked "on" and "off" are attached to the cables.

Operation is by pulling steadily on one of the handles until the transformer breaker assumes the on or off position. Breaker can also be reset after automatically tripping by pulling the off handle as far as it will go and then closing breaker by pulling the on handle.

Two styles are available, No. 1,608,089 for CSP transformers 3- through 25-kva. ratings and No. 1,608,090 for CSP transformers 37½ through 100 kva. Parts supplied include all equipment necessary with exception of the control cables, conduit and padlock.

## New Laminate

*(7) Pennsylvania Transformer Co., Box 330, Canonsburg, Pa.*

A low power factor, low dielectric loss, laminated material. Pennsylite, has been developed by the manufacturer for the switch assembly of its 16- and 32-step underload tap changing equipment. This assembly is used in step voltage regulators, integral unit substations and load ratio control transformers.

The manufacturer states that, with the material, power factor remains constant up to 10-kv. stress and rises only a few per cent for 15-kv. stress when tested in accordance with ASTM designation D-50-47T after conditioning for 24 hours at 100°C. Pennsylite is said to have good aging characteristics and not to blister or delaminate in hot oil up to 120°C. Dielectric strength of ¾-in. thick Pennsylite for 3½-in. spacing, with ½-in. diameter pins under oil shows a withstand dielectric strength of 125 kv. Visible corona under this test appears at 110 kv. which designates the threshhold or ionization point and illustrates homogenous structure of the material.

## Heavy Duty Tumbler Switches

*(8) Russell & Stoll Co. Inc., 125 Barclay St., New York 7.*

The manufacturer's heavy-duty factory-sealed tumbler switch in adjustable flush mounting, explosion-proof enclosure has been designed to meet underwriters' requirements for class 1, groups C and D classifications. These switches are said to be especially suitable for hospital operating rooms. They come in one and two pole, three and four way and nurses call switch interiors.

Furnished complete with switch unit and conduit box either with polished chromium plated cover or aluminum grey baked enamel finish. Switch unit includes tumbler switch with pigtail leads in factory-sealed housing, adjustable collar and finishing cover. Minimum depth wall required is 3¾ in., from finished surface; maximum adjustment ⅝ in. Additional details in bulletin TS-P 10.

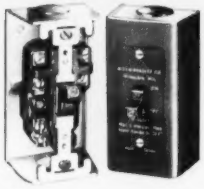
# A COMPLETE LINE of MOTOR CONTROLS

*Take your Pick—*

Here are starters, contactors, relays, and pilot controls for all types of motorized machines. These devices . . . and many more . . . are listed in the latest Allen-Bradley Handy Catalog. Please send for it.

A-B Quality

**FRACTIONAL HP STARTER**
**With Overload Breaker**



*Bulletin 600*—Overload protection for your small motors.

**MANUAL STARTER**
**Across-the-Line Type**

*Bulletin 609*—Most popular hand operated motor starter.

**MANUAL STARTER**
**Watertight Enclosure**

*Bulletin 609*—For installations exposed to moisture conditions.

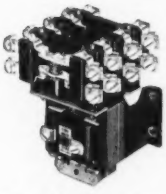
**MANUAL STARTER**
**Reduced Voltage Type**

*Bulletin 646*—Transformer starter for sq. cage motors.

**SOLENOID RELAY**
**D. C. Enclosed**

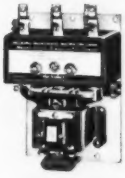
*Bulletin 200*—Relays listed in many contact arrangements.

**SOLENOID RELAY**
**A. C. Universal**



*Bulletin 700 BX*—Changeable from N.O. to N.C. contacts.

**SOLENOID CONTACTOR**
**50 Ampere Rating**



*Bulletin 702*—Contactors available up to 900 amperes.

**AUTOMATIC STARTER**
**Reduced Voltage Type**

*Bulletin 746*—Transformer starter for sq. cage motors.

**SOLENOID STARTER**
**Size 1 • 5-7.5 hp**

*Bulletin 709*—Most popular across-the-line motor starter.

**SOLENOID STARTER**
**Size 2 • 15-25 hp**

*Bulletin 709*—Magnetic starters for all types of service.

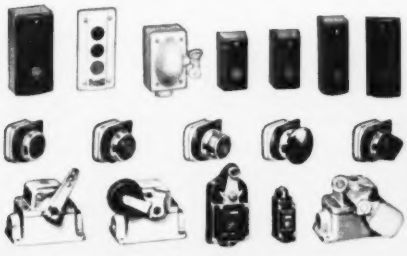
**SOLENOID STARTER**
**Size 7 • 300-600 hp**

*Bulletin 709*—The newest addition to A-B solenoid line.

**COMBINATION STARTER**
**With Disconnect Switch**

*Bulletin 712*—Saves space and makes neater installations.

**STANDARD, HEAVY DUTY, AND OILTIGHT PUSH BUTTONS • LIMIT SWITCHES**



See Next Page

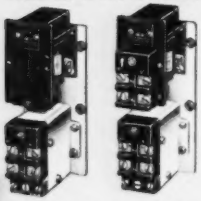
ALLEN-BRADLEY
QUALITY
**MOTOR CONTROL**
(316 S. SECOND STREET, MILWAUKEE 4, WIS.)

# SPECIAL PANELS • CONTROL CENTERS • ACCESSORIES

Allen-Bradley contactors, relays, and timers are widely preferred as components of special control panels. Their long, trouble free life accounts for their universal popularity with machinery builders.

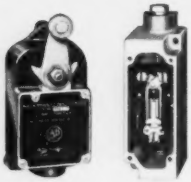
High production machines need automatic controls that are dependable and maintenance free. Allen-Bradley controls . . . good for millions of precision operations . . . are "tops" for performance and reliability.

## PNEUMATIC TIMERS
From 1/6 to 180 Seconds



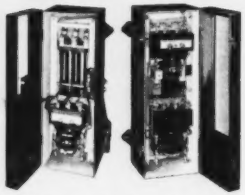
*Bulletin 849*—Dependable timer for a-c & d-c circuits.

## LIMIT SWITCHES
Standard & Precision



*Bulletin 801*—Standard duty.
*Bulletin 802*—Precision duty.

## A-C RESISTANCE STARTERS
Velvet Smooth Motor Control

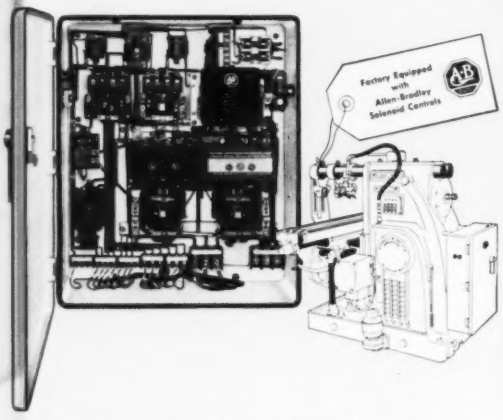


*Bulletin 640*—Manual type.
*Bulletin 740*—Automatic type.

## D-C MAGNETIC STARTERS
For General Applications

*Bulletin 265* with automatic time limit motor acceleration.

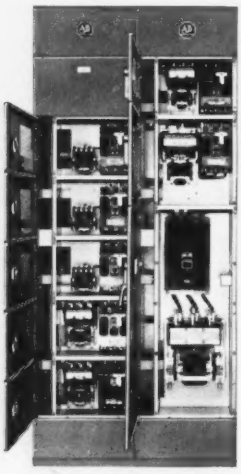
## SPECIAL PANELS FOR SEQUENCE CONTROL
Any Size • Any Sequence • Any Machine




*Special Panels*—Allen-Bradley special control panels can be designed for any sequence of automatic operation of motor driven machines. Let us handle your control problems for you.

## MULTI-UNIT CONTROL CENTERS
For Centralized Operation

*Bulletin 798 Control Center*—All controls are centralized in a neat, compact installation.



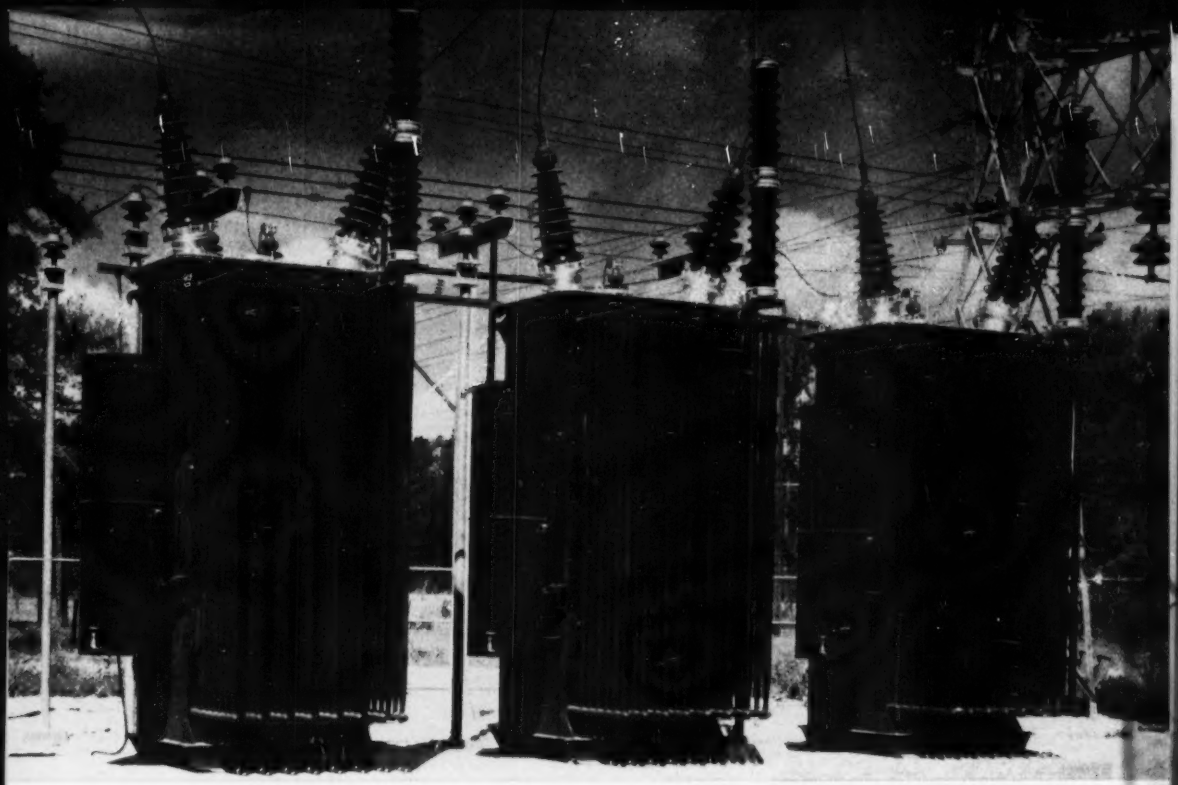
*Bulletin 798*—*With Doors Open*—Shows arrangement of various multi-unit controls.

A-B Quality

ALLEN-BRADLEY
QUALITY
MOTOR CONTROL
1316 S. SECOND STREET, MILWAUKEE 4, WIS.

## STANDARD ENCLOSURES
For Every Service

See Preceding Page



THREE REPETITIVE-MANUFACTURE TRANSFORMERS installed at a substation of a large utility in southeast Texas. They are each rated 1000-kva, single-phase, 67,000 volts to 7620/13200Y. Cylindrical auxiliary tanks contain oil and an inert gas which excludes oxygen, preserves the insulating oil in main tanks.

# Utility Saves 7 Weeks and $3054 on Six Transformers by Ordering RM

**Lower prices and faster shipments have sold a Southeast Texas Utility on the RM* idea.**

A recent specific order shows why: Six transformers were ordered for two important substations. Each was a single-phase, 1000-kva unit—step-down from 67,000 volts to 7620/13200 volts Y. The net price for one of these RM units was $5738, while the net price for a comparable nonstandard transformer was $6247. Total saving—because the utility purchased RM—was $3054, and what is equally important, shipment was made in 11 weeks, versus an average delivery at that time of 18 weeks on non-standard transformers of similar ratings.

*Are you taking full advantage of RM?* Available in single- and three-phase ratings, with or without load-ratio control and fan cooling, RM transformers are easy to apply to your system. For complete listings and application information, write for Bulletin GEC-479, *Apparatus Department, General Electric Co., Schenectady 5, N. Y.*

*RM stands for "Repetitive Manufacture." By using standardized construction methods, General Electric builds RM power transformers more economically—delivers them faster. RM designs are available in ratings 10,000 kva and below and up to 69-kv, with many optional features.

GENERAL ELECTRIC

401-11

With factories in Anaheim, Los Angeles, Oakland, Ontario, San Francisco, San Jose, Seattle, and Richland, and Sales Offices in twenty Western cities.

## Slimline Lampholder

*(9) Sylvania Electric Products, 500 Fifth Ave., New York, N. Y.*

This "fixture"-type slimline lampholder is intended for single-screw fastening. Designed for surface or flush mounting, the device is claimed ideal for use in exposed lamp type fixtures. The high-voltage device (left in illustration) is provided with a spring-loaded movable contact for easy lamp insertion and removal. The unit on the right is used on low voltage. As a mounting accessory for use with the manufacturer's "plunger"-type butt-on slimline lampholder, a U-bracket has been added. Brackets are assembled to the lampholders at the factory and mounting screws are provided for fastening to the fixture. Both lampholders will take all slimline type lamps including the 75-watt T12 size.

## New 50,000-kva. Air Contactor

*(10) Allis-Chalmers Mfg. Co., 939 S. 70th St., Milwaukee, Wis.*

Extensions in ratings of its high-voltage air contactor line (type 256) for general a-c motor control applications up to 2,500 hp. at 5,000 volts or 3,000 hp. at unity power factor, have been announced by this manufacturer .

The new rating of 25,000 amp. for 30 cycles through current makes it possible to use air contactors in conjunction with back-up breakers rated up to 25,000 amp. interruption capacity or 150,000 kva. at 4,160 volts and 100,000 kva. at 2,300 volts.

Since the new contactor can safely pass 54,000 peak amperes, it can be used with non-current limiting fuses rated at 250,000 kva. at 4,160 volts, the manufacturer states. This contactor can also be used without back-up protection where system faults cannot exceed 50,000 kva.

The manufacturer's high-voltage air contactor line now consists of 200- and 400-amp. sizes for 2,500 or 5,000 volts with 25,000- or 50,000-kva. interruption capacity.

## Metering for Heavier Demands

*(11) Westinghouse Electric Corp., 306 4th Ave., Pittsburgh 30, Pa.*

A heavy-current socket (type STU) has been developed to replace common 50-amp. installations being overworked by electric heating and air conditioning in the home. According to the manufacturer, it is suitable for loads up to 200 amp. without current transformers. Heavy terminals emphasize thermal conductivity so that heat is drained rapidly from both socket and meter. The socket takes cables up to 4/0 and, if desired, is provided with an automatic switch that closes the circuit to the load when the meter is withdrawn.

For heavier loads, up to 400 amp., and cable sizes up to 500,000 cir. mils, another socket (type STS known as the Transocket) may be used. Built into it are new-type instrument transformers (MR) designed to give accuracy in the 0.3% class for the metering burdens involved. To facilitate installation, the socket may be connected by the contractor, and the transformer and meter-socket subassembly may be connected to prepositioned adapters by the power company later.

A new polyphase combination watt-hour and demand meter using a thermal principle and built in a detachable socket has been announced also, as has a true polyphase kva. thermal demand meter. The latter has a current-responsive element, indications of which are modified by a voltage-responsive element acting through a linkage to give true kva. indication.

## 400-amp Load Break Rating On Oil Switches

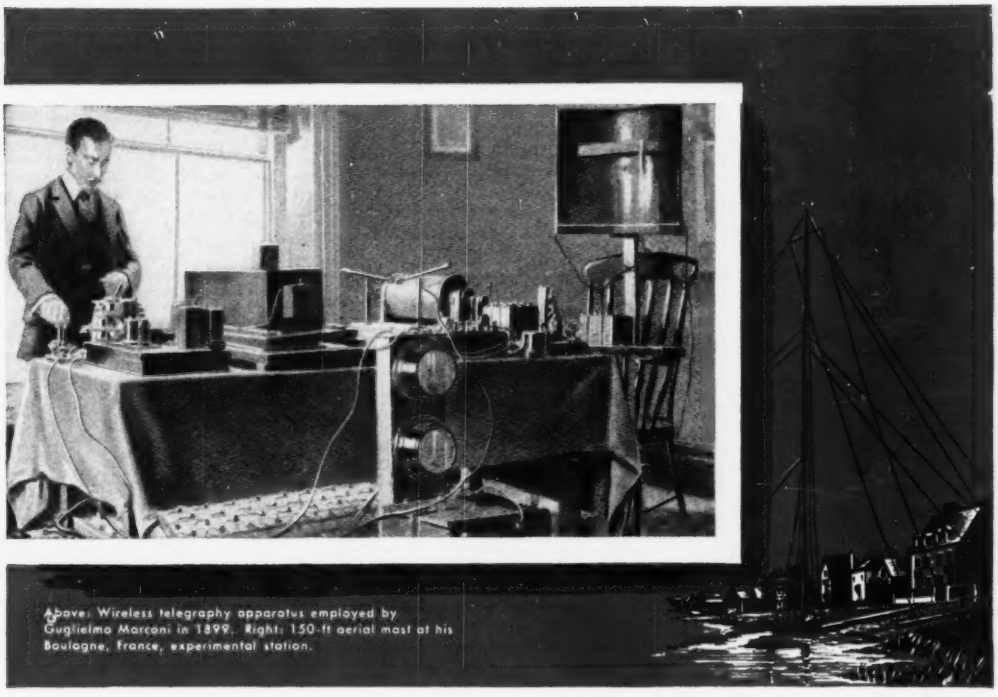
*(12) G & W Electric Specialty Co., 7780 Dante Ave., Chicago 19, Ill.*

Recent load break tests on type RA oil switches show that the full 400-amp. carrying capacity of the switches in each voltage rating—600, 7,500, 15,000 and 23,000—can safely be interrupted by manual operation, the manufacturer states. The non-binding characteristic of the rotary oil seal on type RA operating shafts and the balanced rocker arm links permit free and easy manual operation, it is stated. To break full load manually, it is essential that the operation of the levers can be completed fully without hesitation and as rapidly as possible, it is pointed out.

## Shoe Collector

*(13) Calabar Corp., 8414 Otis St., South Gate, Calif.*

A new Con-L-Duit shoe collector is designed to simplify installation and to increase operating efficiency. Use of a round bar for a mounting bracket is said to permit perfect perpendicular adjustment of the collector to the bar. This assures positive contact at both ends of the shoe collector and by its wiping action is claimed to prevent build up of foreign matter on the conductor bar. This spring-loaded collector allows the shoe to travel freely more than one inch up and down. Under light pressure the shoe follows the variations of the trolley wire or conductor bar with a minimum of friction. A simple junction box is contained within the collector. Field connection requires only the removal of the snap-on cover, insertion of the lead and tightening of the set screw.



Above: Wireless telegraphy apparatus employed by Guglielmo Marconi in 1899. Right: 150-ft aerial mast at his Boulogne, France, experimental station.

# Rendezvous With MASTERY

**1899—and a young man, near Boulogne, France, presses the key of a transmitter. Instantly, his message clicks out on a receiver in Dover, England—32 miles distant. The way has been opened to mastery of instantaneous, world-wide communication.**

**1899—and a Board of Directors of an infant firm, convening for its initial meeting in Newark, N. J., hears the Treasurer state that $1,400 is at the disposal of Driver-Harris Company with which to commence business. The way has been opened to mastery of new facts and techniques which will provide industry with quality metal products never before available.**

"Wireless" has been developed with phenomenal speed since the day Marconi's message was successfully transmitted from Boulogne. Within fifty years—as radio, television, and radar—it has been made to circle and serve the world.

And Driver-Harris, expanding within the same fifty years until represented on all five continents, has produced many of the alloys required. For example: Gridnic* for electron tube grid wire, alloys for radio cathode sleeves and glass seal metals, Karma* and D-H Manganin for resistors, and universally famous Nichrome* and Nichrome V for resistors, plates and other components.

Today, Driver-Harris' specialized knowledge and extensive facilities are employed in supplying superior alloys for a host of applications in numerous fields. The name "Driver-Harris", indeed, has become so widely accepted as a synonym for quality that the demand for D-H products is engaging the resources of the firm to an unprecedented extent. Driver-Harris can only say it is utilizing all the mastery at its command to meet this exceptional demand as fully as possible.

*Makers of Nichrome and over 80 other alloys for the electrical, electronic, and heat-treating fields.*

## *Driver-Harris Company*

HARRISON, NEW JERSEY

Western Representative: ANGUS-CAMPBELL, INC.
1114 Valencia St., San Francisco 449 San Pedro St., Los Angeles

*T.M. REG. U. S. PAT. OFF.

MOTOR AND GENERATOR BRUSHES

For the past thirty-five years we have supplied industry with brushes. The fine reputation acquired during these years merits the statement that OHIO brushes are rated as tops. Brushes for standard machines are carried in stock. Our Engineering Department will help you with special applications.

West Coast Representative
C. F. BOWERS
544 S. San Pedro St.
Los Angeles 13, Cal.

ORDER YOUR CARBON BRUSHES FROM A SINGLE SOURCE

THE OHIO CARBON COMPANY
12508 BEREA ROAD • CLEVELAND 11, OHIO

## Plastic Grille

*(14) General Electric Co., Pittsfield, Mass.*

A plastic grille designed to direct air into practically every part of a room is being molded by G-E's chemical department for the York Corp.'s ¾-hp. model, window-type air conditioner. The grille is 2 ft. long and is injection molded from polystyrene. Since the unit is rotary in design, air can be directed either up or down through 18 small louvers that are mounted on a single frame. Each louver can be adjusted to direct air to the left or right.

## Nylon Safety Straps

*(15) R. H. Buhrke Co., 4701 W. Grand Ave., Chicago 39.*

Nylon safety straps claimed to have breaking strength of the full cross section area better than 3,000 lb. come in six ply, 1¾ in. width. Abrasion machine tests went well over 70,000 strokes without evidence of wear, according to the manufacturer, each stroke being seven inches long over a 1 in. sq. mandrel with a 10 lb. sack weight suspended. The strap was placed in 28° below zero temperatures for two successive nights, still maintained its same flexibility, it is stated.

(16) OILERS—Gravity-feed oilers are now available in 10-oz., 1-pt., 1-qt. and 2½-qt. capacity Pyrex glass or Lucite plastic reservoirs. They come with lock ring or ratchet feed adjustment; are designed to feed any predetermined number of drops per minute. Trico Fuse Mfg. Co., 2948 N. 5th St., Milwaukee 12, Wis.

(17) MG CLEANING—A cleaning method for motor generators that blows and vacuums within air-tight confines of a Blo-Vac cover has been announced by Lehara Sales Corp. for the elevator machine room. Manufacturers address is 485 Fifth Ave., New York 17, N. Y.

(18) WIRE STRIPPER—A stripper that uses the principal of frictionally generated heat to melt enamel and Formex-type insulations is available from the Rush Wire Stripper Division of the Eraser Co., 104 S. State St., Syracuse 2, N. Y.

(19) PLATENS—Uniform heat and long life are claimed for cast-in electrically heated platens manufactured by Thermel Inc., 3440 W. Lake St., Chicago 23. Called Thermaplatens, they come in aluminum for temperatures to 750° F, aluminum bronze, brass, grey iron, copper, meehanite and other metals for elevated temperatures.

(20) F SCREW-IN BULB—Incandescent work lights may be converted to fluorescent by screwing its Lite-Mite bulb into the ordinary lamp socket, according to Stocker and Yale, Marblehead, Mass. The bulb contains two 4-watt F lamps and all control components within the 2x6-in. shade. Model 16-2E is for end mount; model 16-25 for side mount.

(21) INDUCTION MOTORS—A new line of heavy-duty, wound-rotor induction motors has been announced by Electric Machinery Mfg. Co., Minneapolis 13, Minn. The motors come in ratings from 30 to 1,500 hp., drip-proof construction is standard. They give variable-speed drive, are claimed to be advantageous on applications requiring high starting torque and low starting current, or long acceleration periods.

(22) ELECTRIC DRILLS—Four redesigned electric drills are being offered by Skilsaw Inc., 5033 Elston Ave., Chicago 30. They range in capacity from ½ to ¾ in. in steel and up to 1½ in. in hardwood.

(23) LOCALIZED LIGHT—Two series for machine benches, etc. have been introduced by Fostoria Pressed Steel Corp., Fostoria, Ohio. Both carry the UL label. Series 412 incorporates flexible adjustable-tension joints to permit workers to position lights for individual requirements. Series 400 utilizes strong flexible tubing to gain flexibility. Wiring is totally enclosed in both series.

(24) CONNECTOR—Added to the Twin Line units are two new types, the No. 14-1, designed to eliminate need for cutting the twin line in the middle to insert a connector; the No. 14-2, a baseboard junction for the lead from the outside antenna and the lead carrying to the receiver and allied equipment. The original unit, the N. 14-0, is a polarized splicer-type unit. Manufactured by Grayhill, 4524 W. Madison St., Chicago 24.

(25) INHIBITED OIL—Perma-Kuhl introduced by Kuhlman Electric Co., Bay City, Mich., is said to have a service life more than four times that of conventional oil. It will be furnished with all the company's distribution and power transformers.

(26) PROTECTIVE COATINGS—A new baking-type coating intermediate that is expected by the manufacturer to form a base for a new field of protective coatings has been developed by General Electric's Chemical Department, Pittsfield, Mass. Designated as R-108, the coating combines outstanding chemical resistance with flexibility and heat resistance.

(27) MILK COOLER—A front-opening milk cooler is said to effect a 65% reduction of farmer's milk handling work. An 11-in. lift, instead of the 3-ft. lift common with top loading coolers, saves the work equivalent of lifting 2 tons 1 ft. each day, according to the manufacturer, Westinghouse Electric Corp., Electric Appliance Division, East Springfield, Mass. Available with 4-, 6- and 8-can capacity, designed for 115- or 230-volt power source.

(28) RECORDER—A unit that furnishes 30 channels of information in the space required for one normal wide-chart recorder has been announced by Reed Research Inc., 1048 Potomac St., N.W., Washington 7, D.C. It was developed originally for use with an analog computer and a commercial model is now offered. Data may be recorded as often as every two seconds. Unit is available in multiples of six from 12 to 96 channels.

(29) WATER HEATER—Element ratings on this unit may be changed to any required wattage between 600 and 3,000 watts by shifting connections. This development, under test for several years, enables distributors and dealers to supply heaters of various wattages without carrying a large stock. Westinghouse Electric Corp., Appliance Div., Pittsburgh 30, Pa.

# DEPENDABLE ALWAYS!!

Whichever the season, there's seldom any worry about overhead power lines, or customer relations either, when Simplex - ANHYDREX Self - Supporting Aerial Cables are on the job. Anhydrex insulated and neoprene jacketed, they assure trouble-free service year in and year out in any location, and their modern construction does away with the need for excessive tree-trimming.

Anhydrex has excellent electrical properties and is the most stable of all rubber insulations when exposed to water and moisture. The tough neoprene jacket withstands abrasion caused by swaying limbs and chafing against poles and it provides effective protection against fungus, heat, sunlight and weathering.

ANHYDREX Self-Supporting Aerial Cables require little or no tree trimming for installation. The circuit is entirely insulated, and the copper bindings that secure the conductors to the messenger provide a grounded path on the outside. During storms the strong supporting messenger retards line breaks due to falling limbs and ice-loading. Even when poles fall, the well-protected cables will usually continue to operate efficiently.

ANHYDREX Self-Supporting Aerial Cables are delivered ready for installation. They can be clamped to poles already standing. Crossarms and insulators are unnecessary. Few workmen and comparatively little time are needed for the job. But these are but a few of the advantages they provide. For the complete story, simply fill in and return the coupon below.

## SIMPLEX WIRES & CABLES

**SIMPLEX WIRE & CABLE CO.**
**79 Sidney Street**
**CAMBRIDGE 39, MASS.**

SIMPLEX WIRE & CABLE CO.
79 SIDNEY ST., CAMBRIDGE 39, MASS.
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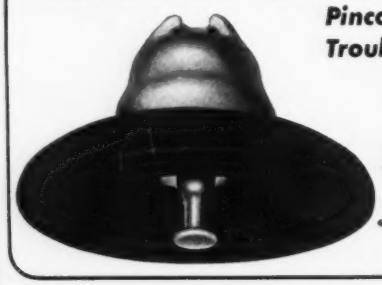
Actually, we don't *yet* know the "life expectancy" of Pinco Suspension Units—for on installations dating as far back as 1921, they have rolled up an impressive service record of *more* than 30,000,000 service years without replacement because of electric or mechanical failure!

**RUGGED CONSTRUCTION**

***Pinco's Answer to Trouble-Free Performance***



1 Every design incorporates rugged sections, beaded edges to withstand impact blows encountered in installation and service.

2 Proper thickness of porcelain in the critical sections to give desired dielectric strength.

3 Proper contour design to give self-cleaning ability to entire shell thereby minimizing current leakage.

Thirty successful years in designing and manufacturing insulators back up the Pinco slogan—"RIGHT *for* the Job . . . RIGHT *on* the Job." Remember this whenever you specify and buy insulators.

***See Page 65 of the Pinco Catalog No. 49 for complete electrical and mechanical characteristics***

The Porcelain Insulator Corporation
769 Main St., Lima, N. Y.

Warehoused and Distributed by JOSLYN PACIFIC CO.
2424 FIRST AVENUE SOUTH . . . . . SEATTLE 4, WASHINGTON
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PINCO INSULATORS

(30) GEAR UNITS—New combined speed reducers and mill pinion stands are available from Westinghouse Electric Corp., Box 2099, Pittsburgh 30, Pa. Designed to drive small- to medium-size mills, these units come in four sizes to be powered by 25-, 50-, 100- and 150-hp. motors.

(31) ALL WHITE LAMP—The Tru-White incandescent lamp introduced by Duro Test Corp., North Bergen, N. J., is claimed to give almost total diffusion without glare or loss of lumen efficiency. It is being made in standard sizes; the coating that gives the all-over luminous quality is on the inside of the bulb and is not affected by atmosphere conditions, according to the manufacturer.

(32) LAMP WIRING—A kit to convert ordinary table lamps for the new G-E white indirect 3-lite bulb has been announced by Monowatt Inc., Providence 7, R.I. This new bulb has a special inside coating said to diffuse light evenly, greatly reduce glare, soften shadows. Its mushroom shape directs light upward and downward in a scientific balance for better over-all lighting. Used with the kit, the bulb lights to 150-watts first, then 100, then 50.

(33) MERCURY SWITCH—For safety in hazardous, explosive locations Panalarm Products Inc., 7212 N. Clark St., Chicago 26, has announced a mercury switch with either push button or selector knob. The unit consists of a hermetically sealed mercury switch mounted on a lever-operated armature. To operate the switch the selector knob is turned or the button pushed, which inclines the armature and actuates the mercury switch.

(34) MOTOR—Its model 800D shaped-pole motor, rated 1/200 to 1/80 hp. has been redesigned and improved by Electric Motor Corp. Division of Howard Industries Inc., Racine, Wis.

(35) LAMP GUARD — A combination safety guard and guide that prevents fluorescent lamps from falling is announced by Edison Electric Co., 355 Weybosset St., Providence 3, R.I. Information is available from Robert P. Koehler, Koehler-Bird Associates, 2 Bradley St., Boston-45- Somerville, Mass.

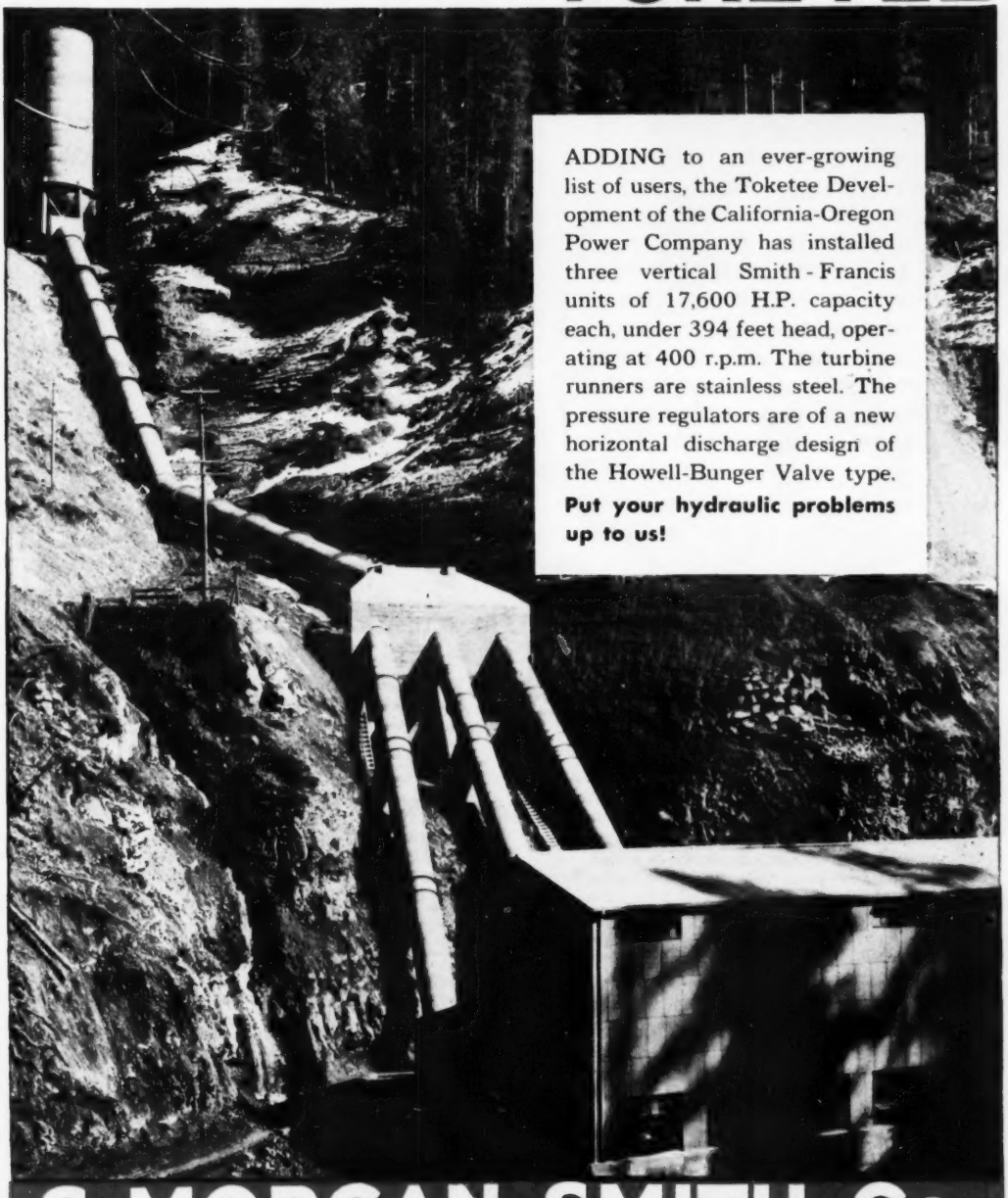
(36) WIRE MARKERS—Quik-Label markers for color coding wire are made of silicone-treated cotton cloth with a pressure-sensitive adhesive backing; are said to stick permanently without moistening. They are made by W. H. Brady Co., 16 E. Spring St., Chippewa Falls, Wis., in 14 standard NEMA colors.

(37) TIME SWITCH—A combination electric and spring-driven clock is utilized in a new time switch offered by the Hagen Mfg. Co., Baraboo, Wis. If electricity fails, the spring-driven unit goes into action instantaneously, the manufacturer states.

(38) MOTORS—A line of small lightweight d-c motors is available from Lear Inc., Electro-Mechanical Division, 110 Ionia Ave., NW., Grand Rapids, Mich. The motors come in continuous-duty models with rated outputs to .5 hp. and intermittent-duty models with rated outputs to 2 hp.

(39) WELDERS—Dual 300/600- and 400/800-amp. selenium rectifier d-c welders are available from Westinghouse Electric Corp., Box 2099, Pittsburgh 30, Pa.

# SMITH-FRANCIS TURBINES AT TOKETEE



ADDING to an ever-growing list of users, the Toketee Development of the California-Oregon Power Company has installed three vertical Smith-Francis units of 17,600 H.P. capacity each, under 394 feet head, operating at 400 r.p.m. The turbine runners are stainless steel. The pressure regulators are of a new horizontal discharge design of the Howell-Bunger Valve type.

**Put your hydraulic problems up to us!**

## S. MORGAN SMITH Co.

YORK, PENNA. U.S.A.

PREPARE FOR TODAY'S CHANGING DEMANDS WITH THESE

# G-E WIRING FACTS!

## 1. WHERE DO YOU NORMALLY LOCATE GENERAL ELECTRIC REMOTE-CONTROL MASTER SELECTOR SWITCHES?

This new multi-purpose G-E master selector switch gives homeowners control of up to nine different lights or outlets from a single point. But do you know WHAT LOCATIONS ARE RECOMMENDED FOR MASTER CONTROL SWITCH INSTALLATIONS?

## 2. WHAT WIRE SHOULD YOU USE IN LOCATIONS EXPOSED TO GASOLINE?

Until now, this problem required the use of heavy, lead-sheathed cables. Today, General Electric's new lightweight, hydrocarbon-resistant wire helps you do the job efficiently and economically. WHAT SHOULD YOU SPECIFY?

## 3. WHAT IS THE BEST PROTECTION FOR MACHINE TOOL LEADS THAT ARE SUBJECT TO VIBRATION?

Rigid protection used for this purpose is often bulky and fails to provide the necessary "play." There is a simple solution. But, DO YOU KNOW WHAT'S BEST?

## 4. HOW MUCH WEIGHT CAN YOU SAVE PER 1000 FEET OF PVX CABLE?

Small in over-all diameter and easy to strip, General Electric PVX* nonmetallic sheathed cable speeds farm and residential wiring. But one really important advantage is the saving in weight it provides. Can you guess HOW MUCH?

## 5. HOW DO YOU AVOID "ROCKING" WHEN YOU INSTALL A SWITCHBOX?

The new G-E Levelock switchbox solves the problem of rocking during installation—speeds rough wiring on any job. HOW?

---

### Answers

1. ☐ The most popular locations for the master selector switch are in the master bedroom and at entrance doorways. But, customers can specify its installation in any convenient spot.
2. ☐ General Electric Geotrol Type TW wire is the full name of this new gasoline-and-oil resistant wire.
3. ☐ Use G-E flexible steel conduit to simplify vibration-proof installations in close quarters.
4. ☐ General Electric size 14/2 PVX cable weighs 142 lb less per thousand feet than metallic armored cables—with similar savings in other sizes.
5. ☐ The G-E Levelock switchbox has four leveling projections. It can't rock or tilt.

*Registered Trade Mark of General Electric Company

### FOR FURTHER INFORMATION

on any General Electric wiring materials, see your G-E Construction Materials distributor, or write to Section K51-125, Construction Materials Department, General Electric Company, Bridgeport 2, Conn.

GENERAL ELECTRIC

With Factories in Anaheim, Los Angeles, Oakland, Ontario, San Francisco, San Jose, Seattle, and Richland, and Sales ffiOces in twenty Western cities

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**Call your Central Conduit distributor**

# HE HANDLES THESE *Four Famous Raceways*

Your Central Conduit Distributor handles quality products. That's why he sells and recommends Central Rigid Steel Conduit. It's made in four different types to provide you with an electrical raceway that will exactly fit your needs.

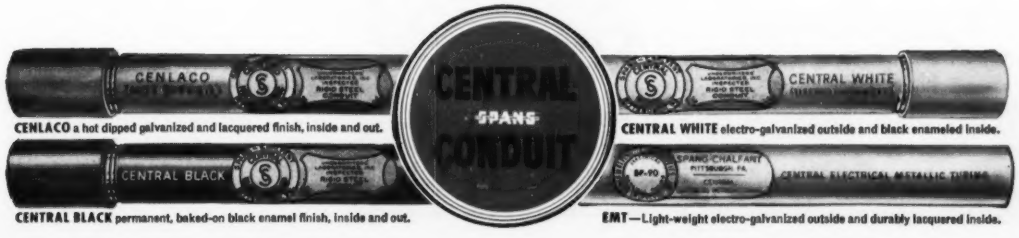
**Cenlaco** has a hot dipped galvanized and lacquered finish. **Central White** has an electro-galvanized outside finish and a black enameled inside finish. **Central Black** has a permanent, baked-on enamel finish inside and out. **Central EMT** is a light-weight conduit with an electro-galvanized outside finish and has a durably lacquered inside finish.

In addition to quality products, you can depend on your Central Conduit Distributor for friendly service. He'll go out of his way to see that you are fully satisfied.

Unprecedented demand has made it impossible at times for him to always completely fill your orders immediately. But keep in touch with him. He will make sure that you get a fair share of his supply.

## SPANG-CHALFANT

**Division of The National Supply Company**
**General Sales Office: Grant Bldg., Pittsburgh, Pa.**
**District Offices and Sales Representatives in Principal Cities**




**CENLACO** a hot dipped galvanized and lacquered finish, inside and out.

**CENTRAL WHITE** electro-galvanized outside and black enameled inside.

**CENTRAL BLACK** permanent, baked-on black enamel finish, inside and out.

**EMT**—Light-weight electro-galvanized outside and durably lacquered inside.

TOUGH

## BRANDED FOR YOUR CONVENIENCE

Impressed into the tough Bronco 60 Neoprene jacket is information which tells at a glance whether you have the right cord or cable for the job—such data as type, size, and voltage.

**Western Insulated Wire Co. knows that you want your portable cords and cables *tough*, yet easy to handle. For toughness, Western sheathes Bronco 60 with oil-resistant, flame-resistant, acid-resistant Neoprene jackets. For ease of handling, Western not only brands Bronco 60, but also makes it . . .**

### *FLEXIBLE FOR CONVENIENT HANDLING*

Bronco 60 is exceptionally flexible for the same reason a cowboy's lasso is flexible. The individual cable components are *free to move* slightly in relation to each other.

### *PACKAGED FOR CONVENIENCE*

Coils of Bronco 60 are individually packed in clearly-labeled, corrugated cardboard cartons. This makes for neater, more efficient storage; simplifies inventory control; facilitates loading, handling, and shipping.

*Impressed into the Bronco 60 jacket at two foot intervals before vulcanization are: the trademark "Bronco 60," the type and size of cable, number of conductors, rated voltage and "P116BM"—flameproof registration number of the U. S. and Pennsylvania Bureaus of Mines.*

*Manufactured by*
**WESTERN INSULATED WIRE CO.**
2425 East 30th St., Los Angeles 58, Calif.


(40) F LAMPS—Four new lamps have been developed by the Solar Electric Corp., Warren, Pa. Two lamps, the deluxe cool white and the deluxe warm white, combine more "red" light to give a natural appearance to complexions and objects. A standard cool white is for business establishments, schools and factories where cool atmosphere and high efficiency lighting is required along with a positive stress on colors; the standard warm white is for high efficiency lighting in warm atmospheres where F lamps are used in conjunction with incandescent lighting and it is important to stress the color tones.

(41) CAPACITOR—An electrolytic motor starting capacitor small enough to be placed in the motor end-bell or base has been developed by Cornell-Dubilier Electric Corp., South Plainfield, N. J. The aluminum container is 1⅛ in. in diameter and 2⅝ in. long. The insulating tube adds 1/16 to diameter and 5/16 to length.

(42) MOTOR—Slow-speed geared electric power drives are available in the single-phase capacitor-type design from Sterling Electric Motors Inc., Los Angeles 22, Calif. These motors are built with single or double reduction gears, providing speeds from 780 down to 30 r.p.m. in ratings of ½ to 3 hp. inclusive.

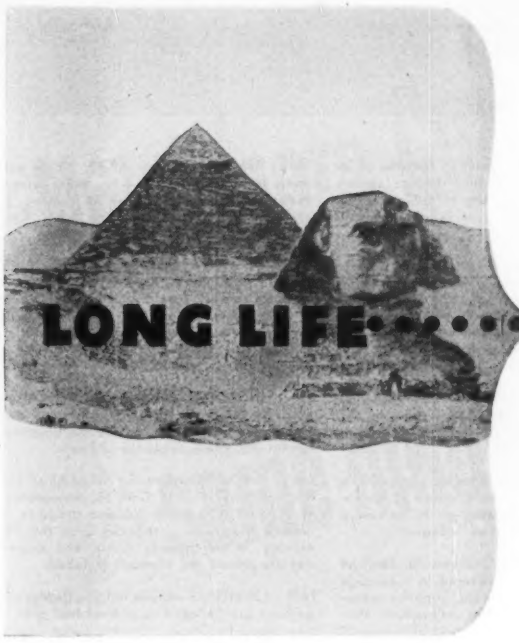
(43) LINESTARTER—A combination Life-Linestarter, class 11-206-N, combining motor starter, motor protection and disconnect in a redesigned enclosure to save space and increase safety is available from Westinghouse Electric Corp., Box 2099, Pittsburgh 30, Pa. Designed for across-the-line starting of squirrel-cage induction motors, or as a primary switch for wound rotor motors, this unit features the new Life-Linestarter, AB De-ion circuit breaker, and slamproof selfindicating interlocked handle. With capacities from ¼ to 100 hp. and 110 to 600 volt polyphase, the unit is available in NEMA sizes 0 through 4 and NEMA-type enclosures, 1, 1A, 3, 4, 5, 7 and 9.

(44) GEAR HARDENING MACHINE—A radio-frequency gear hardening machine for high production heat treating of gears is available from Westinghouse Electric Corp., Box 2099, Pittsburgh 30, Pa. Called the Inductall, this machine is used with a vacuum-tube radio-frequency generator, a 10,000-cycle motor generator set, and associated equipment.

(45) DRAW BAR—The pump operated Ohio draw bar manufactured by Patterson Equipment Co., Denair, Calif., pulls ½ to 4-in. conduit holes. Thirty pound pressure on handle produces 12,000 pressure on cutting surfaces. Successful application on metals up to 10 gage is reported by the manufacturer.

(46) INTERLOCK RECEPTACLE—A receptacle with automatic circuit breaker for hazardous locations developed by Panellit Inc., 7218 N. Clark St., Chicago 26, is available in capacities up to 20 amp.

(47) REMOTE CONTROL—Electric remote control for its Speed-Trol (variable speed) power drives is offered by Sterling Electric Motors Inc., Los Angeles 22, Calif. This is a package unit design, which may be mounted on any size Speed-Trol of current design by the user in the field and is also available with new motors at the factory.




# CERTIFIED BALLASTS ...are built to outlast the LIGHTING FIXTURE

(They're silent as the Sphinx, too!)

For long, trouble-free, satisfactory fluorescent lighting—insist on **CERTIFIED BALLASTS,** the ballasts that usually outlast the lighting fixtures!

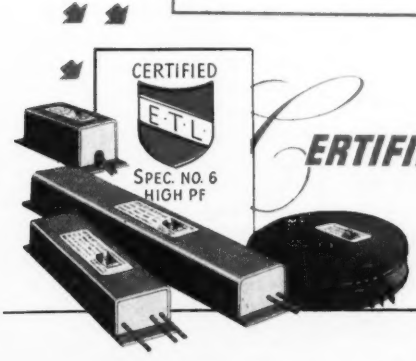
**CERTIFIED BALLASTS** assure not only long, satisfactory ballast life, but rated light output and full lamp life, too. **CERTIFIED BALLASTS** are quiet in operation. They're your best bet for peak performance and highest operating economies.

**CERTIFIED BALLASTS** are made to exacting specifications, then tested and checked by Electrical Testing Laboratories, Inc.

Insist on **CERTIFIED BALLASTS**—and be safe!

● Complete information on the types of CERTIFIED BALLASTS available from each participating manufacturer may be obtained from Electrical Testing Laboratories, Inc., East End Avenue at 79th Street, New York, N. Y.

*Participation in the CERTIFIED BALLAST program is open to any manufacturer who complies with the requirements of CERTIFIED BALLAST MANUFACTURERS.*

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*Makers of Certified Ballasts for Fluorescent Lighting*

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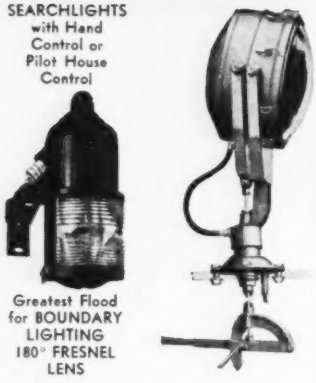
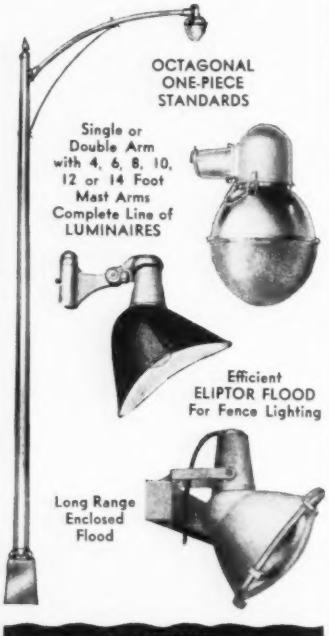
ELECTRIC MFG. CO. CHICAGO, ILL.
LIGHTING
Protect your property at night!

SEARCHLIGHTS with Hand Control or Pilot House Control



Greatest Flood for BOUNDARY LIGHTING 180° FRESNEL LENS

Get in Touch With Us At Once



OCTAGONAL ONE-PIECE STANDARDS

Single or Double Arm with 4, 6, 8, 10, 12 or 14 Foot Mast Arms Complete Line of LUMINAIRES

Efficient ELIPTOR FLOOD For Fence Lighting

Long Range Enclosed Flood

REVERE ELECTRIC MFG. CO.
6016 BROADWAY — CHICAGO 40, ILL.
STOCKED BY L. M. BAXTER & CO.
SAN FRANCISCO—SEATTLE—PORTLAND
LOS ANGELES: BRACKEN SALES AGENCY

# BULLETINS ETC.

(48) MOTORS—Construction features of its large 2-pole squirrel-cage induction motors are given by Allis-Chalmers Mfg. Co., 939 S. 70th St., Milwaukee, Wis., in Bulletin 05B7550, recently published.

(49) TRANSFORMERS—A 4-page bulletin describing its air-cooled distribution transformers, various types of air-cooled power center and packaged power units, and lighting transformers, single and three phase, has been prepared by Marcus Transformer Co. Inc., 32-34 Montgomery St., Hillside 5, N. J.

(50) FIXTURES—A descriptive sheet (D-5010) on its new line of 425-ma., T-12 slimline fixtures is offered by Colonial Electric Products Inc., East Paterson, N. J.

(51) INSTRUMENTS—Wheelco Instruments Co., 847 W. Harrison St., Chicago 7, has released a condensed catalog of its indicators, controllers and combustion safeguards.

(52) TURBINES—Allis-Chalmers standardized steam turbine units are covered in a 16-page bulletin, 03B6801A, available from the manufacturer at 939 S. 70th St., Milwaukee, Wis. The bulletin includes the six sizes of standardized units—11,500, 15,000, 20,000, 30,000, 40,000 and 60,000 kw.—and the 90,000-kw. turbine.

(53) AMMETER—A booklet describing its Amprobe, a pocket-size snap-on volt ammeter is available from Pyramid Instrument Corp., 49 Howard St., New York 13, N. Y. The tool measures 7 1/8x2-9/16 in.

(54) RELAYS—A new catalog listing its line of heavy-duty, 1-, 2- and 3-pole mercury plunger relays and sensitive relays is available from Ebert Electronics Corp., 185-09 Jamaica Ave., Hollis 7, N. Y.

(55) RURAL SUBS—Substations built up from standardized components for rural distribution systems are described in a 12-page booklet (B-4697) released by Westinghouse Electric Corp., Box 2099, Pittsburgh 30, Pa. Combinations of the various types described cover more than 95% of all rural substation requirements, the manufacturer states. The booklet shows pictorially six of the more common substation arrangements.

(56) SWITCHGEAR — Indoor and outdoor switchgear is described in a 20-page bulletin from Allis-Chalmers Mfg. Co., 939 S. 70th St., Milwaukee, Wis. Standardization advantages of metal-clad switchgear construction are given, along with a table of space requirements for standard low-voltage switchgear. The bulletin is 18B6185A.

(57) RELAYS—Data on relays, shaded-pole motors and timers are given in catalog 109 prepared by Potter & Brumfield, 221 N. Main St., Princeton, Ind.

(58) ARRESTERS — Keystone expulsion-type lightning arresters are the subject of a 40-page publication from Electric Service Mfg. Co., 17th and Cambria St., Philadelphia 32, Pa. The first ten pages cover commercial and semi-technical data; the rest of the bulletin is largely technical.

(59) RESTORER—Type AP-40, 3-pole automatic service restorer, 14.4 kv., motor-rewound reclosing type, is described in catalog 840 available from Pacific Electric Mfg. Corp., 5815 3rd St., San Francisco 24.

(60) SWITCH — Catalog 121 from Pacific Electric Mfg. Corp., 5815 3rd St., San Francisco 24, covers type TW-1, outdoor, group-operated rotating-insulator, vertical-break air switch. Ratings are 24.5 kv., 400, 600 and 1,200 amp.; 46, 66-S and 69 kv., 600 and 1,200 amp.

(61) INDICATOR—Bulletin 7A from Associated Research Inc., 3758 W. Belmont Ave., Chicago 18, gives data on the manufacturer's pocket-size phase sequence indicator.

(62) CATALOG—Catalog 161 of Allied Electric Products Inc., 76 Coit St., Irvington 11, N. J., lists Allied and Sheldon products, including new items introduced since the 1950 catalog. Wiring devices, lamps and accessories are among the products included.

(63) LIGHTING—Home lighting display suggestions are included in a loose-leaf publication issued by General Electric Lamp Department, Nela Park, Cleveland 12, Ohio. The publication is intended for use with the G-E home light conditioning program recently launched. Suggestions are given on home or school study center; lighting for hand sewing; laundry lighting; portable lamp promotions; fixtures and portable lamps; dining room lighting; dresser lighting for facial make up. Booklet may be secured from the Inquiry Bureau of the lamp department at Nela Park.

(64) HELICOPTERS—Uses of the Hiller 360 in line parol,, trouble shooting, survey, wire laying, transportation, weed clearing, etc., are told by United Helicopter, Palo Alto, Calif., in a recent bulletin.

(65) CATALOG — A new 1950-51 edition giving data on the Abolite lighting line has been announced by the Jones Metal Products Co., West Lafayette, Ohio.

## Fill in the Postcards on Page 43

Manufacturers' bulletins are a good way to keep informed. To get more information about new products listed in this section or to secure the bulletins mentioned on this page, fill in and mail the bottom postcard on page 43.

Information on any department in the magazine can be secured by filling out and mailing the second postcard on page 43. Use this card for asking questions or making suggestions.

# Now! more Cutout for the same money

**HEAVY DUTY FUSE CUTOUTS**

THE NEW G-E 100-AMPERE HEAVY-DUTY FUSE CUTOUT GIVES YOU

- **1 cutout for either 50- or 100-ampere requirements—with positive full range operation.**
- **Interrupting ratings of: 8000 Amperes at 2.5 KV**
  **5000 Amperes at 5.2 KV**

YET IT COSTS NO MORE THAN ITS 50-AMP PREDECESSOR

Cutout door without fuse link

**OTHER FEATURES**

- **POSITIVE INDICATION** of blown fuse is given by a double spring-operated indicator arm.
- **FLASHOVER PREVENTED** by a synthetic sponge-rubber barrier cemented to the cover.
- **RECOIL CUSHION** is achieved by springs located between the door and the hinge.
- **CLEAR IDENTIFICATION** from the ground is assured by a white disc monogram.
- **CORROSION SHIELDED** terminals and contacts.
- **EEI-NEMA STANDARD** mounting bracket provides side swivel and vertical or angle-tilted mountings.

Interior of cutout housing

YOU'LL LIKE THE ECONOMY AND RELIABILITY OF THIS NEW GENERAL ELECTRIC CUTOUT FOR YOUR HIGH CAPACITY FEEDERS. SEE YOUR LOCAL G-E REPRESENTATIVE FOR COMPLETE DETAILS, OR WRITE FOR BULLETIN GEC-704.

*Apparatus Department, General Electric Company, Schenectady 5, New York*

**GENERAL ELECTRIC**

406-37

**With factories in Anaheim, Los Angeles, Oakland, Ontario, San Francisco, San Jose, Seattle, and Richland, and Sales Offices in twenty Western cities.**

# ELECTRA'S HUSBAND

ELECTRA'S eyes were red-rimmed as though she had been crying and her greeting lacked the customary warmth and enthusiasm as I came into the hall a few days before Christmas.

"What's the matter, bad news? Somebody sick?" I asked.

"No, it's none of those things," she answered. "I've been on the verge of tears all afternoon."

"You can't have any troubles that bad," I commented. "Something must have gone wrong."

"I guess it's just that I listened to too many war reports from Korea and too many commentators today," she mused, "It all added to my feeling of frustration about doing something to help out. Lord knows that the country is in a terrible mess and it galls me to see the complacency with which most of us go around doing business as usual or living as usual. Even you don't seem to be excited about the situation in your business."

"Now wait a minute," I interrupted. "Our industry is doing something. It's building night and day to make certain that there won't be any power shortage. And the manufacturers are ready to convert at a moment's notice to the production of war materiel."

"Maybe so, but the great mass of the people aren't aroused," she continued. "It's only the ones who have somebody actually in the fighting that are worried. And they have cause to be. If you want to know what really set me off, it was a letter that Mrs. Cowan just received from her grandson in Japan. She brought it down for me to read and I kept it for you."

"You mean the young air corps lieutenant who was here just after Christmas last year?" I asked, "the one with the pretty wife and tiny baby?"

"Yes," she answered.

She walked into the bedroom and came back with an envelope. Here is what I read:

"Dear Gram:

"Well the waste has hit the circulator. It appears that we are in for a nice little war, and in this one there won't be any punches pulled.

"I am deeply concerned over what is going to happen to us, and I am sure that the people in the States are just as concerned. It is difficult for me to reconcile myself to a war that will completely destroy every material advantage that we possess, not to mention the strong possibility that our way of life will be destroyed. I find that I, being as close to this conflict as I can get, cannot comprehend the terrific results of the Chinese intervention in Korea. I also know that it is even more difficult for the people in the U.S. to realize the tremendous import of the Chinese aggression. It would be extremely hard for me if I had a house, worked an 8-hour day, enjoyed the company of my family every night, went out to a movie or to supper on Sunday and otherwise enjoyed the highest standard of living anyone has ever had, to bring the remoteness of Korea and Manchuria right into my living room.

## A LETTER FROM JAPAN

"I live in a nice heated room with running water, lights, etc., and I find myself thinking that it must be tough on the ground-pounders who are out doing the slogging in the mud and cold. After a few minutes of sympathy I pop a piece of candy in my mouth, pick up a book and settle down for a nice comfortable evening. I can do this even after the sobering effect of flying a mission in support of these ground troops, and seeing the whole front erupt in flame and explosion. If I can be complacent, I know that there are people at home equally complacent. I just wonder how they can back up, turn completely around and start rearming. I am afraid World War II is going to look like a children's party compared to what we are going to be required to sacrifice. A bombed Los Angeles, Chicago or New York is hard to see, but that is what you must contemplate. It looks like the job of Air Raid Warden will take on an added meaning . . .

"My only concern right now is for Pat and Cork. If I could get home with them just to see that they were set up and taken care of, I would be ready to come back and fight this thing to the end.

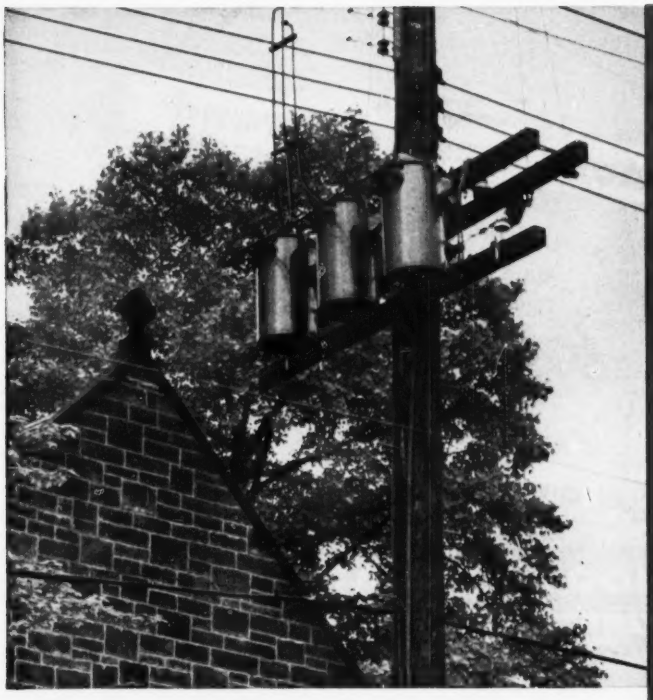
"There is no doubt in my mind we will be in the forefront of any action that will come. There is no doubt also in my mind that it will be certain death. If death isn't forthcoming, then it will mean I will in all probability be chief of staff of the USAF before the thing is over. That is somewhat exaggerated but there is a certainty that living will bring a great deal of rank. My one regret is that we don't have modern, up-to-date equipment. I would give anything to have a nice jet strapped to my tail—at least I would feel like I had a chance. Don't misunderstand me—this B-26 has done a whale of a job and it is good for a few more jobs. But it isn't any airplane that will hold its own against the newest fighters.

"As you see, I am worried. There is no doubt about that, but I'm not worried as much about myself as I am about Pat and Cork and about the wakefulness of the U.S. Perhaps my worries aren't justified but I have just gone on my own reactions to war. I know what the people of the U.S. put out during the last war—a lot but far below the capacity of all. The article 'Background for War' in a recent issue of *Time* describing the Russian potential to make war, pointed out that the Russians have sacrificed so much that their reaction to sacrifice would be almost nothing, whereas the people of the U.S. have sacrificed so little that a great deal of sacrifice would be harder. This is as it should be in any peaceful world, but in a wartime situation it is hard to reconcile. Please don't think I am putting the finger on you or any of your friends but you know yourself that the general attitude in the last war was one that could have been bolstered a lot.

"I haven't done much since I last wrote. Flown a few missions . . .

"Enough of this—I let myself go and it is hardly the type of thing that should come before Christmas. I think I am going to be able to spend Christmas with Pat and Cork. I've been saving for my pass for just that reason."

Now you know why Electra felt bad.



A 1000 kva power transformer ready to receive sound level tests in Allis-Chalmers Pittsburgh Works sound laboratory. Laboratory walls of concrete, glass wool and acoustical tile exclude 99.98% of exterior noise power.

Here a distribution transformer is getting sound and harmonic analysis. Physical noise level and harmonic index are new tools to measure sound energy. Transformer designs, in addition, are tested in accordance with ASA and NEMA standards.

# Quiet Neighborhoods NEED QUIET TRANSFORMERS

## How to Beat Transformer Noise—That's The Problem Allis-Chalmers Engineers Are Tackling In Their Pittsburgh Sound Laboratory

TODAY'S DEMAND FOR quieter transformers is stronger than ever before. Larger rated transformers are moving into residential areas as distribution systems grow up. That's why holding customer good will depends more and more on keeping transformer sound level low.

What is Allis-Chalmers doing about sound level? In cooperation with sound experts, Allis-Chalmers engineers are conducting research on new electrical core steels in an effort to reduce magneto-striction and resonance. They're testing effects of clamping pressures, core impregnation and anchoring of core and coil assembly. Their laboratory is specially equipped for sound level experiments.

What will be the result? Transformers that create good will. Research, engineering and production are teaming up at Allis-Chalmers to give you a transformer that is truly a good neighbor.

For details on Allis-Chalmers transformers contact your nearby A-C sales office or write for bulletins:

Bulletin 61B7309A — *ACP* (Allis-Chalmers self-protected) distribution transformers.

Bulletin 01B6168B — Complete A-C power and distribution line.

Bulletin 61B6014A — Substation transformers, 50 to 500 kva.

A-3170

ALLIS-CHALMERS, 939A SO. 70 ST.
MILWAUKEE, WIS.

ACP (Allis-Chalmers Protected) is an Allis-Chalmers trademark.

**ALLIS-CHALMERS**

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JANUARY 1951 Vol. 106, No. 1

ELECTRICAL WEST

SPOKESMAN FOR THE MOST HIGHLY ELECTRIFIED SECTION OF THE U. S.

# HOW TO BE A GOOD BOSS

- **Have you Technical Knowledge ? How about administrative ability ?**
- **How do you measure up in leadership ? Do you have social insight ?**
- **Do you want a profile of what makes a good Big Boss, good Little Boss or just plain good supervisor ?**

**Willard V. Merrihue***

Manager, Employee and Community Relations, Apparatus Division, General Electric Co.

THERE is an old Turkish proverb to the effect that "a dying fish first starts to stink at the head." To paraphrase this: "Show me the Big Boss of the outfit and I will tell you what kind of employee relations he has." I do not mean only the Biggest Boss of All—the chief executive of an outfit—but the lesser Mr. Bigs, the vice-presidents, the branch managers, the district sales managers, and all others who are the top men in the area in which they are situated.

If the boss leads instead of drives, if he has a real warmth and instinctive liking for people, if he is a regular guy, if he knows how to and does listen, if he surrounds himself with human beings who factor human relations considerations into their decisions, then his attitude will be reflected by his operating managers, his professional people, and all other members of management, including the all-important first-line supervisor—and you have the fertile climate for good employee or labor-management relations.

To be more specific, we learned through a poll of our employees several years ago that they wanted these nine elements in their jobs: good pay; good working conditions; job security; good bosses; fair promotion practices; respectful treatment; full information; belief in the job's importance; and job satisfaction.

It is profoundly important to note that with the exception of pay, working conditions, and job security, all the other things that our employees want in their jobs can best be supplied by their immediate boss. Therefore, a supervisor is a fairly important guy who deserves more than a promotion to bosshood and then eternal neglect. I think you will pardon me, therefore, if I talk a bit about "what makes a good boss tick," as measured by one company's specifications.

### Profile for a Good Boss

Our profile for good bosses comprises these characteristics:

Adequate *technical knowledge*. They have the know-how to play short-stop if one of the team gets injured. This, however, is not quite as important as it was in former years.

*Administrative ability*. The good administrator knows how to analyze problems, organize the work, deputize the work force, and get things done efficiently and promptly; the good administrator will also set up definite goals for his people to aim at. Gerard Swope, our former president, and one of the world's best administrators, stated administration succinctly: "Analyze, Organize, Deputize, Supervise."

The *ability to lead*. He knows how to get things done *through* people, not *by* people. He can get the very best out of the group because they trust him and have confidence in him; they will follow his orders without a feeling of resentment.

They will do this because the leader has another priceless characteristic—which is:

*Social insight*. He has studied people. He understands the things that motivate people—and, understanding them, he knows how important it is to satisfy these motivations. He knows that his people are generally *motivated by two basic desires*: (1) One of these big yearnings is security. Security from hunger, from the climate, from physical danger; and here's one we usually forget, the security that comes from knowing what the boss expects of you, the security that comes from the praise of the boss for a job well done or prompt discipline for a sloppy job. (2) The other big yearning that motivates people is the desire for self-realization; to accomplish something worthwhile. This is the powerful force that motivates men to accept greater responsibility, to make suggestions, to stick their necks out constructively.

* Based upon an address before the First Hawaiian Conference, Pacific Coast Electric Association, Honolulu, November 30, 1950.

The good leader knows that most of his men won't take responsibility as long as they don't have security; that is, so long as they don't know what the boss expects from them or where they stand with him.

Those two things—the desire for security and the desire for self-realization—are two of the strongest drives attributed to human beings by the psychologists. And they can best be guaranteed to your people through high quality, human-relations-minded supervisors.

#### Four Essential Characteristics

Another characteristic of a good boss is the ability to make *good* and *prompt decisions.* If he is very, very smart, he will consult with his staff or his people—unshackle their minds and let them help him arrive at the right decision. But, right or wrong, he will make decisions as promptly as possible, knowing as he does that the lad who puts off decisions inflicts the deadliest of creeping paralysis on his work force.

A really fine leader of men is *dynamic.* He has a ceaseless gnawing ambition—not alone a *selfish* one for *personal* advancement — but a powerful propelling urge to try new ideas, new techniques, to blaze new trails—to find a simpler, better way to do old things. Like a great general, he'll take a chance at the proper time and set his followers afire by his optimism, faith and daring.

Good leaders have a deep sense of responsibility for their workers, for their own habits and actions, for their families, their community, and their company. Because of this maturity people find them steady, dependable. They know what to expect from day to day. And that gives followers a sense of security.

The good leader has *character.* This is an abstract thing but it can be likened to the steel framework of a giant skyscraper. Although not seen from the outside, it makes the building strong and safe.

For the last characteristic I have listed *personality.* This is the package—bright and inviting, or somber and forbidding—in which a man wraps up his personal characteristics and presents them for "sale," or "no sale," to the world. Anybody can, if he will try, develop a fairly attractive personality, simply by finding out what pleases people and then resolutely setting out to please them.

We've always had a lot of good bosses in General Electric but the significant point is this: We are now assiduously cultivating what formerly grew wild. Although we have been pecking away at the fringe of this problem for some time, we have just signed a contract with the Psychological Corp. of America to do a bang-up research job with us in better methods of selecting better supervisors for today's job.

But we can't wait 'til all the problem bosses retire so we are conducting a continuing program to improve present leadership.

First we are telling our bosses they must improve their *management manners.* When a man becomes a supervisor he is granted power—power over insecure people. Does he *grow up* or *swell up* with power? That is the first great test a man must meet in his ability to attract followers!

Even in this enlightened age of lip service to human relations, we find supervisors who have swelled up with power; who have low ethical standards; who practice petty tyrannies on their people. Their subordinates are sullen, hired mercenaries, not eager, resourceful followers—a pack of dogs in which never a tail wags—ready-made propaganda fodder for the self-seeking and subversives. Why shouldn't they turn to the various "isms" if this kind of boss typifies democracy? And all the words in the world can't give a company staffed with that kind of leadership good employee relations.

Brushing up on management manners is a long step forward in developing loyal followers. Thinking of little human touches also works wonders.

Next, we tell our bosses, in our human relations training course, never make the mistake of thinking that the worker's need for security can be met simply by steady work, good pensions and insurance, or guaranteed annual wages. His *greatest* security must come from you.

Douglas McGregor, former head of the Industrial Relations Section of M.I.T., and now president of Antioch College, says that the boss who gives his workers the greatest feeling of security is the one who creates an "atmosphere of approval." This atmosphere is created not so much by what the boss does, but by the *way he does it* and his *underlying attitude toward his subordinates.* He goes on to say, it is relatively independent of the strictness of the supervisor's discipline or the *standards of performance* which he demands. Security for the rank and file is possible only when they know they have the genuine approval of their supervisor. A supervisor can create this atmosphere of approval by doing three simple things:

1. Letting the men know what is expected of them.

2. Letting the men know where they stand—"How'm I doing?"

3. Maintaining consistent discipline. Employees develop a real sense of security when they know that "right actions" will be praised and backed up—and that "wrong actions" will always be criticized or punished.

#### Kindness vs. Discipline

Some fellows, claims Dr. McGregor, try to substitute kindness for discipline. They try hard to be good fellows—fail to maintain discipline or good standards of performance. Their people take advantage of the situation. The superior then begins to disapprove of his subordinates (even though he is to blame). He cracks down hard or else he grows more critical and disapproving. Because he fails to maintain discipline in an atmosphere of approval his followers feel insecure. Their work suffers and the boss says "What the hell! There's nothing to this good-boss business!"

Every worker requires the security of knowing that he can count on the firm support of his supervisors for doing what is "right," and firm pressure (even punishment) for doing what is wrong. A *mild* discipline will get results in an atmosphere of approval, whereas harsh discipline can fail badly in an atmosphere of disapproval.

"Why all this namby-pamby business of giving the workers a feeling of security with the boss?" I almost hear some of you saying. Simply because the worker can't start achieving his second great yearning—self-realization or achievement—until he feels secure.

Thus, the supervisor who establishes the climate or atmosphere whereby this second great motivation of men can be tapped is really on his way to the races. This is where the gold lies.

Once the worker feels secure with his boss, he starts to blossom out, to develop himself, to seek responsibility, to stick his neck out constructively, to want to participate, to give out with good ideas, to achieve and accomplish.

Here we are then, at the meat of the cocoanut.

You have become a good boss—you have given your associates peace of mind—inner security. They are now ready to make you look great—to help you excel. How do you do it?

#### Good Communications

This brings us to communications. You take them into what amounts to a partnership of information. You show them that you and they have common goals—to meet a budget of orders; to win back a customer considered lost; to cut down paper work in the office; to use time more effectively; to find new ways to cut costs and meet shipping promises.

And *always*—you talk things over with them.

Are you troubled with absenteeism? *Talk it over* with the offenders. Are you having a rush of grievances? Remember, a cup of water spiked with information will put out 90% of all fires *—at the beginning.* Ninety per cent of potential grievances can be avoided by talking it over early enough.

Is the "going tough" on a new expense-reduction program? Talk it over with the employees.

If you are about to move a group into another building or office—talk it over with them in advance—invite questions—ask for suggestions.

If you want to help them believe that their jobs are significant, talk over with them the importance of their assignments and particularly try asking their advice on some problem. I know of one foreman who made a sweeper feel like a million dollars by asking him to look after a newcomer to the ranks and give him some orientation.

Remember, the secret of good employee relations is first to get the workers fullest participation, teamwork ideas, to help him achieve self-realization—to *uncork* all the creativity and productivity stored up in him. The *corkscrew* is leadership.

Listen to what Mr. McGregor has to say about this: "Genuine cooperation among all members of an industrial family is *actually* quite possible. But it can only be given to emerge when the mechanisms of genuine participation become an established part of the organization routine."

What does he mean by "mechanism?"

I take it to mean two things: (a) a favorable atmosphere created by the supervisor to give the workers a feeling of security, and (b) some formalized procedure whereby the workers are given more of a chance to participate in the progress of their section.

### The Employee Round-Table

Our formalized procedure or mechanism is the General Electric Employee Round-Table. In this procedure, the foreman or supervisor meets with his people periodically around a table in a conference room during working hours. He tells them how they're doing as a unit, what the backlog of business is, why better quality and cost reduction are vital for future job security. He may explain some recent policies of the company or new benefit plans. Then he throws the meeting open and asks for suggestions and questions. He is told never to bluff. If he doesn't know the answer, he must get it and deliver it to the questioner within 24 hours, if possible. He must keep minutes of the meeting and send them up the line until they get to the top manufacturing man so that there may be real two-way communication.

These round table or employee informative conferences not only build good bosses but they build good followers because they help the employees to achieve self-realization, a sense of belonging to the team, a new feeling of significance. They encourage each man and woman on the team to think.

Not long ago we made a study at our Erie, Pa., plant to see what our employees thought of these round tables. Ninety-five per cent were overwhelmingly in favor of them—and here's why, in their own words:

1. Get to know the foreman better.

2. These meetings break down chasm between us and the foreman. (I wonder if most of you realize the chasm that's between many supervisors and their people. Wrong lift of the eyebrow —gruff absent-minded remark—sleepless night on the part of the employee —"I wonder what he meant?")

3. Lots of work methods are improved as a result of these meetings (suggestion system).

4. We get a chance to present problems to the foreman *when he has time to think.*

5. *We have a say in decisions.* We're surprised to learn that what we say is important.

6. *We get to know what everyone else does and why.* We get to *know what the whole thing is about.*

And there you have, summed up in words used by the employees, a simple formula for high morale on the part of the employees. More important, it is a sure-fire formula to employ in the developing of better bosses.

When we can get that kind of free-flowing two-way communication between each employee and his boss, we have at least the rudiments of a partnership between management and labor. It won't work unless your first-line supervision also meets regularly with their bosses.

So we established the "MIC," or Management Informative Conferences, with a regular full-time coordinator in each plant.

Finally, once a year, we insist that the Big Boss himself appear personally before all of his people and give an account of his stewardship. This is *some* job for the general manager of a large division such as turbine for example. To cover his 5,000 people this fall, he had to appear before seventeen different groups, a number of them on the graveyard shift. I ask *you:* Are we serious in this business of democratizing business?

In conclusion, I'd like to quote an old philosopher who once summed up all of man's life in these few words: "Filling what is empty, emptying what is full, and scratching when it itches."

It is only when we managers or bosses in business and industry today decide to take the time to fill that emptiness of the people that work with us through our kindness, consideration, square-dealing information, and any other devices which will give them an interest in whether the team wins or loses—that we can expect them to suggest and participate and then believe that free enterprise as practiced today is really a democratic institution.

## Can You Top This ?

A utility has some strange experiences involving customer relations. Two of several reported by F. V. Frey, customer relation division of the Pasadena Municipal Light & Power Department follow:

A pet monkey had escaped from its leash, climbed to the top of a 50-ft. pole and refused to come down after some hours of coaxing by its master. The utility received a call to send a lineman to help get the monkey down. The lineman arrived at the scene and immediately went up the pole to rescue the pet. But the monkey did not think this was such a good idea and started across the secondaries to another pole. The lineman then went up the other pole and the monkey in turn traveled back across the secondaries to the first pole. When a second lineman arrived at the scene, the poor monkey was at a loss to know what to do, being caught in the middle of a span. After some shaking and swinging of the wires he decided that he had had enough, came down one of the poles and was carried away by his master—all to the delight of the crowd that had gathered.

A lady called frantically to the trouble desk and explained that her dog's tail was caught in an electrically driven mangle. A man was dispatched to help the lady extricate the dog. After using a screw driver and backing up on the gears the dog was freed. He showed his appreciation by licking the man's hand and wagging a wee bit mangled tail.

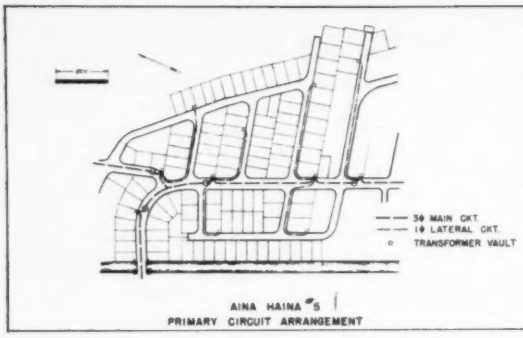



Fig. 1—Primary circuit arrangement, Aina Haina subdivision

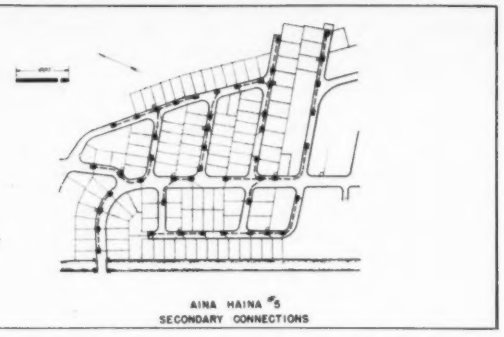



Fig. 2—Secondary runs, service boxes for same subdivision

# Low Cost Underground in Hawaii

C. H. Williams*
Principal Electrical Engineer
Hawaiian Electric Co. Ltd.

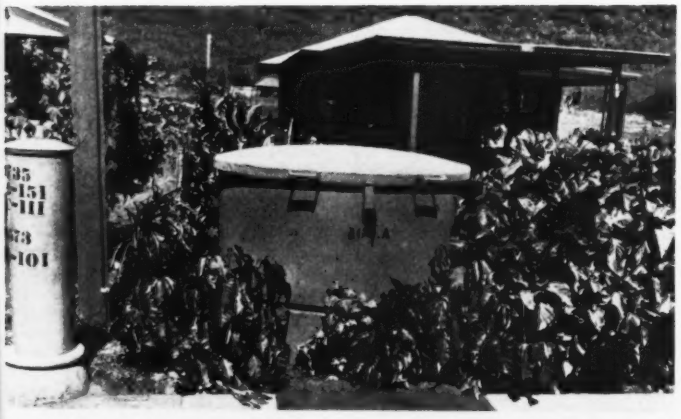


Fig. 5—Completed transformer vault; shows secondary junction box in foreground

Fig. 6—Transformer vault interior, showing Positect cutouts and cable connections

Cost of any underground system can be low only by comparison to another underground system. It cannot be compared to an overhead line. This is especially true in Hawaii where it is not necessary to build for heavy loading for either winter weather or hurricanes. In the overhead system wire costs approximately 40c per circuit-foot for a 4-kv., 1/0 substation feeder. By comparison a cable circuit of the same thermal capacity costs $3 per circuit-foot. With this comparative cost per circuit-foot of basic material it is easily seen that a residential area traversed by a substation feeder will be very expensive by comparison to an overhead system. Both this type underground system and the more reasonable type tapped off a substation feeder are discussed.

The Hawaiian Electric Co. Ltd. has installed approximately 13 lineal miles of residential underground distribution systems since 1945. Approximately five miles of this has been installed in one valley, Aina Haina, on the Koko Head side of Honolulu, in increments of approximately one mile at a time. Company policy would provide only overhead facilities in these areas so the subdivider was required to pay the excess cost of underground facilities. Cost of services to houses was not included in this excess cost. The individual resident is charged the full cost of service from his property line in at the time service is installed to his house. Other than for service cables the subdivider digs the necessary trenches and backfills them after

* Abstract of paper before newly formed Hawaiian section, Pacific Coast Electrical Assn., Nov. 30, Dec. 1, 1950.

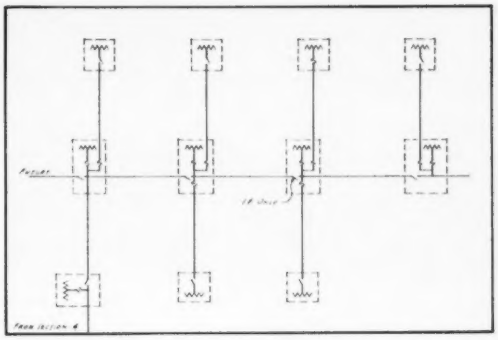


Fig. 3—Primary circuits in section of underground system

Fig. 4—Vault consists of concrete pipe section with steel top

the cables are installed. Therefore this cost does not enter into cost quotations to the subdivider. For comparative purposes, representative costs have been obtained for digging and backfilling in typical areas. Normally the utility shares the same trench with the telephone company and in some subdivisions the city and county share the same trench for their street lighting cables.

Obviously, a subdivider is primarily interested in low initial cost as this is the only part of the electric service that involves him. On the other hand the utility has many other interests to consider. An underground system should be designed to give service at least very nearly comparable to an equivalent overhead system. This involves frequent sectionalizing in extended systems and does not tend to keep the initial cost low.

If underground systems required less maintenance, it would be a salvation. To date there is insufficient information to count on this. One of the big maintenance items on overhead systems is caused by termites attacking poles. The company has its fingers crossed hoping termites will leave its cables alone. To date there have been three failures of non-leaded cables definitely attributed to termites, one in a duct and two in direct burial cable. Only one of these was a neoprene jacketed cable.

An underground system must have a long life span as it must be maintained and replaced by the utility without any contributions from subdividers or customers. Underground connecting devices used in the Hawaiian design are expected to last as long as the cable. Naturally, the life of the cable is unknown, but it is hoped that it will last longer than poles.

The underground system must not become obsolete because of load growth or even revolutionary new appliances. If the cable had to be replaced in 10 or 15 years the cost of the system would be prohibitive. After studying the future load predictions of *Electrical World* and others and noting the basis used for the design of underground systems, it was decided to use a demand of 4 kw. per customer, averaged over the number of houses normally served by one transformer. It is believed that this is justified, considering the chances being taken by installing underground. There is a record in a recent Edison Electric Institute paper of one company using a demand of 5 kw. per customer for its underground design. Beside the difficulty of replacing directly buried cable, both primary and secondary, there is the transformer location problem. Lots are obtained for transformer housings free, before the subdivision is placed on the market, but it would be next to impossible to get additional transformer housing locations if they were needed because of load growth. Also, the possibility of requirements for three-phase power in residences in the future is forever with us.

To show design and construction methods the accompanying sketches and photographs are included.

Primary circuiting in one section of the large Aina Haina Valley is shown in Fig. 1. Single-phase laterals are composed of one conductor, No. 4/0, 5,000-volt, rubber-insulated, neoprene jacketed cable. Each branch line originates in a transformer vault and is fused in this vault. Transformers are 2,400 volts, connected phase to neutral on a 4,160-volt solidly grounded common neutral system. Fig. 2 shows the

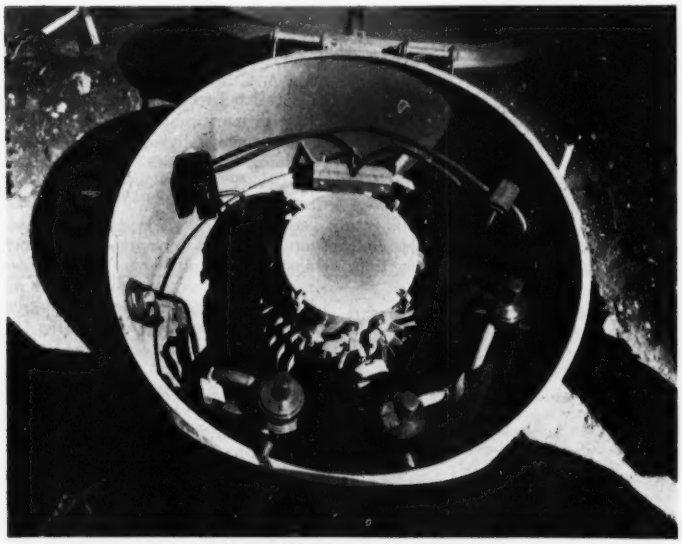


Fig. 7—View looking down into vault, showing transformers, primary connections

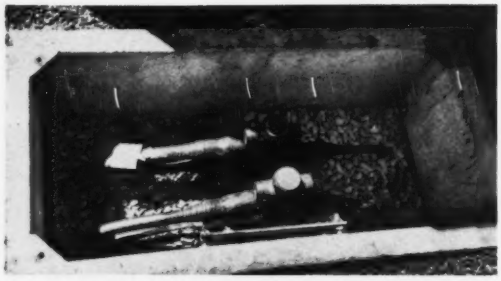


Fig. 8—Open bottom secondary box; cable and moles shown

Fig. 9—First 6 in. of backfill is fine mesh to protect cable

same section with secondary cables and boxes indicated. A precast concrete box with ¼-in. checker plate cover is installed at approximately every other property line. Transite Korduct in concrete is installed across the roads for service cables to houses across the street. Only one duct is installed with a three conductor, 1/0 cable to supply the two houses across the street. A branch connector is used on the end across the street with the connection made in the ground. Secondary mains consist of two single conductor, 4/0, 600-volt cables and a 1/0, TBWP, common neutral. Secondary mains from adjacent transformers are not tied together as one transformer will not carry the load in two sections. Portable transformers mounted in trailers are used when transformers fail. Fig. 3 is a single-line diagram of the primary circuiting for the same subdivision.

A view of vault installed is shown in Fig. 5. Transformer vaults consist of a standard 4-ft. diameter, spun concrete pipe section 2 ft. 6 in. high, buried 1 ft. 6 in. in the ground. Pipes are spun with a block of wood in them to make an entrance for the cables. There is no extra charge for this. They cost $35 each. Over the concrete pipe is placed a housing made of Corten (corrosion resistant) steel. The housing has a cover that can be opened and locked by one man. The hinged cover weighs 140 lb. Ventilation is provided at the junction of the housing and the concrete and at the edge of the cover. The steel housing is made by a local welding shop and costs $265. This is a total of $300 for the vault consisting of the concrete pipe and steel housing.

In Fig. 6 and 7 is shown a 37½-kva. transformer mounted in one of the vaults. (Vaults will take a 75-kva. transformer). This illustrates the case where it is necessary to install three fuses and three sectionalizing devices in vaults on the principal street. For sectionalizing, 200-amp. Positect cutouts that are slugged are used. These operate by lifting the cover straight up so that they take up very little space. A 50-amp. Positect is used for the third fuse in the vault. This is installed on the side where the cable is shown wrapped around the mounting fixture. Primary cable is 350-MCM, 5,000 volts, rubber insulated, neoprene jacketed and is not shielded. It is terminated by penciling the insulation and jacket back and inserting the wire directly in the Positect. The jacket is not cut back.

A closeup view of a secondary box with cables and moles installed is shown in Fig. 8. Note that the box has no bottom. Moles are used for making connections to the secondary cables. A mole is actually an insulated bus bar with tapped openings that take a socket and nut assembly, and a cone so that a mechanical connection can be made easily with the cables hot. Services can be connected at any time to these moles. Cables are shown laid in Fig. 9 and the contractor has started the backfill. The first 6 or 7 in. of fill is sifted through a ½-in. mesh for the protection of the cable. After 6-in. of backfill, precast concrete slabs are placed over the cables for protection. The balance of the backfill is normally whatever is available. Precast slabs are superior to cast-in-place slabs because contractors insist on forming to save concrete. This has resulted in stakes being driven through cables and wood being left in the trench to attract termites. Often a question comes up regarding the location of cables. Usually they are placed between the sidewalk and the property line, 6 in. from the property line. There is not enough room between the curb and the sidewalk for street lighting cables and standards, telephone, fire hydrants and power company cables.

Another type of underground is used in smaller subdivisions. This is where feed comes from an overhead line. This type is usually much more reasonable than one traversed by an underground feeder. A single-conductor, No. 4, 5,000-volt cable with a No. 4 neutral fed from an overhead line is all the primary cable that was required to serve one subdivision with one vault supplying ten houses. The cable and transformer are both fused on the riser pole.

Each of the two types of subdivisions discussed have ten houses per transformer vault. This is not a design standard. It was brought about by the subdivision location and design and the necessity for sectionalizing. As many as 17 residences will be served from one vault.

Cost data are given for the larger subdivision in Fig. 10. Comparative data are given in Fig. 11 for the smaller subdivision. The cost of underground for the larger subdivision is 5.5 times the cost of overhead, and 2.5 times in the smaller subdivision. This is the general range encountered on the Hawaiian Electric Co. system.

117 lots—10 vaults—46 boxes
6,375 ckt. ft. pri.—6,550 ckt. ft. sec.

| | | |
|---|---|---|
| Cost u.g. equip | $29,000 | |
| Cost digging | $ 2,600 * | |
| Total cost u.g. | $31,600 | 5.4 ratio |
| Total cost o.h. | $ 5,900 | |
| Total cost to subdivider | | $25,700 |
| Cost per lot to subdivider | | $220 |
| % of cost of $5,000 lot | | 4.4 |
| Total cost u.g. per lineal ft. | | $6.10 |

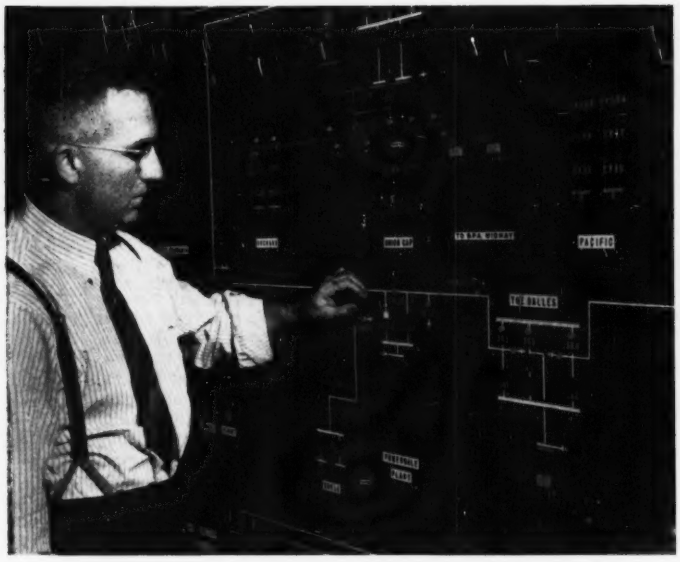
* Prorated share for electric power use.

10 lots—1 vault—4 boxes
480 ckt. ft. pri.—310 ckt. ft. sec.

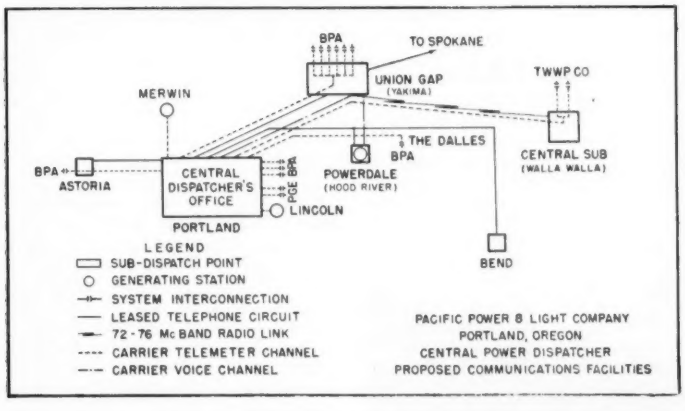
| | | |
|---|---|---|
| Cost u.g. equip. | $2,230 | |
| Cost digging | $ 230 * | |
| Total cost u.g. | $2,460 | 2.2 ratio |
| Total cost o.h. | $ 980 | |
| Total cost to subdivider | | $1,480 |
| Cost per lot to subdivider | | $148 |
| % of cost of $12,500 lot | | 1.2 |
| Total cost u.g. per lineal ft. | | $5.35 |

* Prorated share for electric power use.

Fig. 10, 11—Comparative underground and overhead costs for 117 lots and 10 lots



# Dispatcher's Board Uses Alnico Magnets




A new centralized power dispatching office to serve 1,100 miles of transmission lines and 4,350 miles of distribution through which the Pacific Power & Light Co. serves a large share of the lower Columbia River Valley has been established in its general offices in Portland. Through the varied communication lines of the dispatching center flows the information by which Pacific operates an electric system that ranges inland nearly 350 miles from the Pacific ocean and runs more than 200 miles from Bend in central Oregon to Yakima in south-central Washington. Through the dispatching center also moves the information that keeps the company's operations coordinated with other utility systems that make up the Northwest Power Pool.

To keep the system responsive to varying conditions in its widespread service area, five subdispatching points have been set up as shown. These handle detail operations within their immediate areas under supervision of the system dispatcher in Portland. Sub-offices are located at Yakima and Walla Walla, Wash., and at Astoria, Bend and Hood River, Ore. Prior to concentration of system dispatching responsibilities in the new center, dispatching operations of Pacific were divided between Lincoln station in Portland, the company's largest steam-electric plant, and Pasco, Wash. Both of these dispatching points have been discontinued.

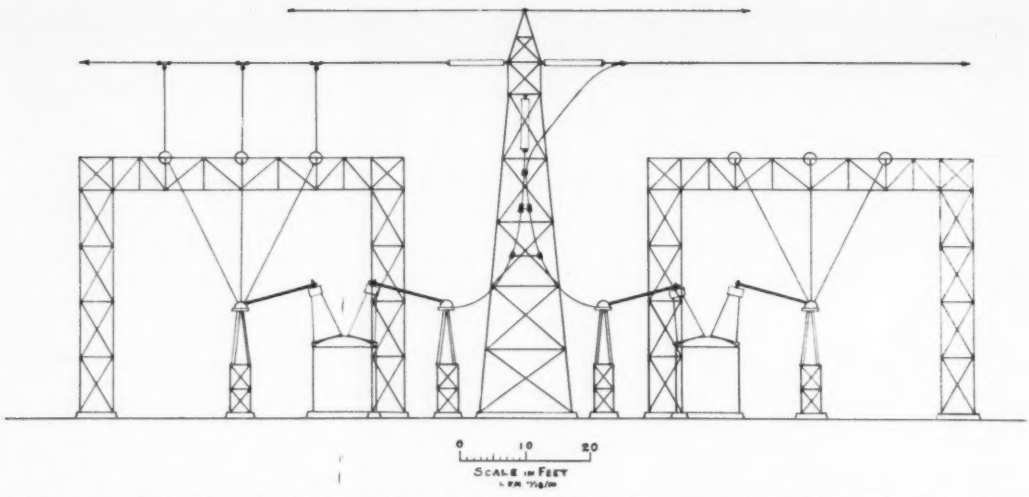
Focal point of the central dispatching office is a one-line diagram of the system plotted on a curved steel panel 8 ft. high and 30 ft. long. This system map curves around two sides of the dispatching office on a radius of 20 ft. The dispatcher's desk is located at the center of curvature to bring all points of the diagram into even focus.

Holophane units with special lenses are mounted in the sound-proofed ceiling and follow the curve of the map panel to provide uniform, non-glaring illumination of the entire surface. For sound-deadening purposes, a 6 in. space between the steel panel and a plywood wall backing it is filled with a vermiculite insulation.

The steel map panel is painted "dispatcher's green" for easy, restful visibility. The one-line diagram itself is formed on the painted steel surface with colored adhesive tape. Each color of tape is assigned a specified voltage value, ranging from bright red for 220,000 volts to a dark green for 480 volts. A color chart prominently located on the board provides instant identification of color values. As designed by Pacific, the board represents one of the most flexible arrangements possible, and is instantly responsive to change.

Transmission lines, transformers, substation buses and switches are shown on the diagram, with oil circuit breakers indicated as rectangles and air-break switches as circles. Alnico permanent magnets in rectangular and circular form are used to indicate switch positions, as illustrated. They are strongly attracted to the steel panel and remain perfectly in place, but are easily replaced by others during switching operations. Red magnets indicate closed switches or breakers, while green magnets mark open positions. For safety, the green magnets are equipped with hooks to hold red tags marking circuits cleared for work.

Channeling of information from all over the system into the new dispatching center requires the use of a variety of communication systems. These include leased telephone circuits, carrier-current voice channels and the company's base-mobile FM radio network. Future plans include some point-to-point radio as well.




**All but one trouble causing vertical insulator strings are eliminated in this money-saving simplified 230-kv. bus design**

# Simplified 230-Kv. Bus Effects Economies

1. Saves 40% in space.
2. Saves 50% in insulators.
3. Saves 40% in steel.
4. Insulators are easily washed hot.
5. Horizontal insulators increase reliability.
6. Simplicity improves reliability.

**Lloyd F. Hunt**
Chief Electrical Engineer
Southern California Edison Co., Los Angeles

**OCB bushing is used as contact mounting for 230-kv. tripod disconnecting switch**

Simplicity is the basic requirement for economical continuity of service. That is axiomatic. This is particularly true in high-voltage switchyards. Unfortunately the trend has been toward bigger and more complicated switchyards. This has increased investment and maintenance expense and decreased reliability. The great savings in space, material and equipment, the improved reliability and lower operating expense that simplicity would effect seem to have been overlooked. The two main problems in high-voltage equipment are insulation and electrical connections.

The diagram above shows a section of simplified 230-kv. bus and switching equipment. This simplified form takes approximately 60% of the ground space required by the smallest conventional equivalent switchyard. It requires less than 50% of the insulator stacks and at least 40% less steel. The diagram shows a method of using not only a minimum of insulators but also

shows the method of using the necessary stacks in the most advantageous position to guard against contamination of the insulator surfaces. Horizontal strings of insulators have proven, by years of experience, to be much superior to vertical strings in the presence of salt-laden fog or contaminated atmosphere.

Two methods of terminating the lines on the main dead-end tower are shown. The one on the left is connected directly to the bus. The one on the right is dropped down and connected to the two disconnecting switches. This is the only location where vertical strings of insulators are used; the rest are horizontal. The insulators of the tripod disconnecting switches are at sufficient angle to prevent the normal rain drip from shortening out the skirts of the supporting insulators. These switches use a 60° vertical-lift blade operated by turning the inner stack of insulators. The contact pressure on the oil circuit breaker bushing terminal is made after the travel of the blade is completed. Contact material is silver.

The two buses are directly over the hinged end of the disconnecting blade and are supported by the two end steel racks, using only horizontal strain insulator strings, one at each end of the bus. The electrical connections of this construction are made a minimum by running the line conductor all the way to the first disconnect switch as shown. If washing is required for eliminating the contamination hazard, all the horizontal strings of insulators should be arranged with the petticoats toward the steel mounting. This allows washing from the racks, whether hot or de-energized. The disconnect switches are mounted low to facilitate maintenance and cleaning.

The competent parts of this simplified bus are not new or untried. The Southern California Edison Co. is using tripod-mounted insulator disconnection switches with contact clips mounted directly on the oil circuit breaker bushing. Both are shown in the photograph. At least one manufacturer makes such equipment.

This same arrangement of buses is equally applicable to all voltages. On lower voltage buses, the insulators of the disconnecting switches could easily be made horizontal, thus causing an improvement over the conventional vertical insulators. This type of buswork is adaptable to many schemes of connection using the minimum of circuit breakers for flexibility. For instance, two lines and two transformer banks use only four circuit breakers, and yet allow one to be taken out for maintenance without dropping any service. The various bus schemes will be covered in a subsequent article.

# CAPACITORS CURE MOTOR BURN-OUTS

U. G. Karrer*

Macco Construction Co. operates a quarry, rock crusher, and hot batch asphalt plant near Brisbane, Calif. In common with other plants of this nature its electrical problem primarily involves the most economical distribution of energy to widely separated heavy motor loads. The power company received complaints involving low voltage and consequent motor burn-outs. The customer's operation involved keeping a large number of trucks rolling with loads of hot material that could not be stored, with the result that a motor burn-out not only shut down the entire plant but also stopped all the trucks and put the company in a critical position in its contractual obligations.

A manufacturer's representative had been attempting for some time to sell the customer power factor corrective equipment without success. However, successive burn-outs with an attendant loss of time, together with the expense of rewinding 50-hp. motors, brought the situation to a near state of emergency. As is generally found in situations of this kind, the customer will blame the power company instead of his own equipment. It then becomes incumbent upon the company not only to clear itself but to come forward with a solution to the customer's problem.

On investigation it was found that the transformer installation was adequate and that 480 volts was being maintained at the secondary terminals. However, poor power factor caused excessive voltage drop in the customer's wiring, which in turn caused the motor burn-outs. It was found that the power factor was running in the order of 55% and that the customer was paying a power factor penalty on his bill that ran about $65 per month. The manager was urged to reconsider the equipment manufacturer's proposal to install PF corrective equipment.

As a result the customer embarked on a program which resulted ultimately in the installation of 165 kva. of capacitors. The power factor was improved from the initial 55% to a minimum 65%. This eliminated the penalty, the low voltage problem, and motor burn-outs.

Even disregarding the fact that the customer's major expense in the shutdowns was the idling of expensive equipment and personnel together with the cost of rewinding 50-hp. motors, the elimination of the power factor penalty alone was calculated to absorb the cost of the corrective equipment in approximately three years. Because of this improvement of power factor on the customer's part, the transformer bank was later able to take a moderate increase in load without the necessity of installing additional transformer capacity.

## Two Welders, One Source

U. G. Karrer*

A San Francisco manufacturer operates a sheet metal fabricating job shop with the usual line of sheet metal machinery including power brakes, shears, grinders, etc. Principal power load is two single-phase, 60-kva. resistance spot welders. The problem was to operate the two welders concurrently without creating undue and unreasonable voltage fluctuations on the primary feeder, which supplied the surrounding domestic and light commercial area. On this basis the power company was able to supply either of the welders but not both. As a matter of standard policy, PG and E serves single-phase spot welders of less than 100-kva. rating without regard to service disturbance. However, if the welder exceeds 100 kva. it is served under a form of absolving service agreement which relieves the company of maintaining service to it if the installation results in excessive disturbance to third parties.

It occurred to the utility's power engineer that, since the welding operation was so short in relation to setup time, it might be possible to time the welding on each individual machine so that continuity of production would not be impaired and besides avoid making both welds simultaneously. This angle was discussed with the welder control manufacturer and a method was devised to cross-connect the foot controls so that one welder would lock the other out during actual welding. Since actual welding time is in the order of 1/5 sec., the delay was not perceptible to either operator. In effect, the cross-connection operated as a rapid-action double-throw switch. This represented an ideal solution to the problem for everyone concerned.

* Industrial engineer, Pacific Gas and Electric Co., San Francisco. From papers presented before a recent meeting of the Pacific Coast Electrical Assn.

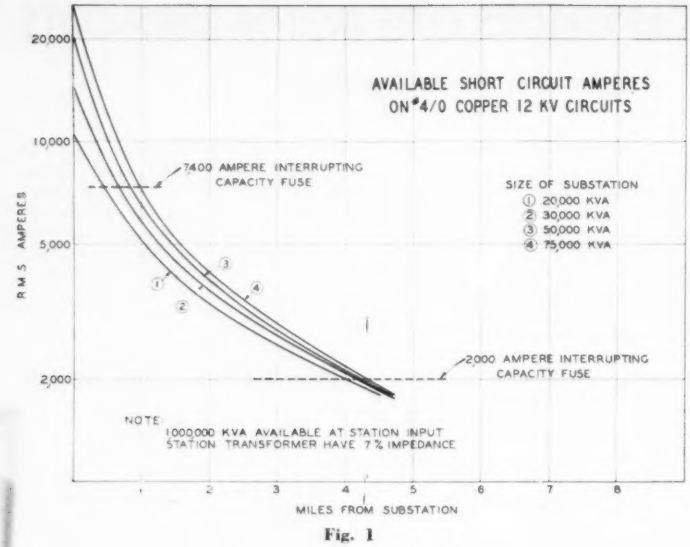



Fig. 1

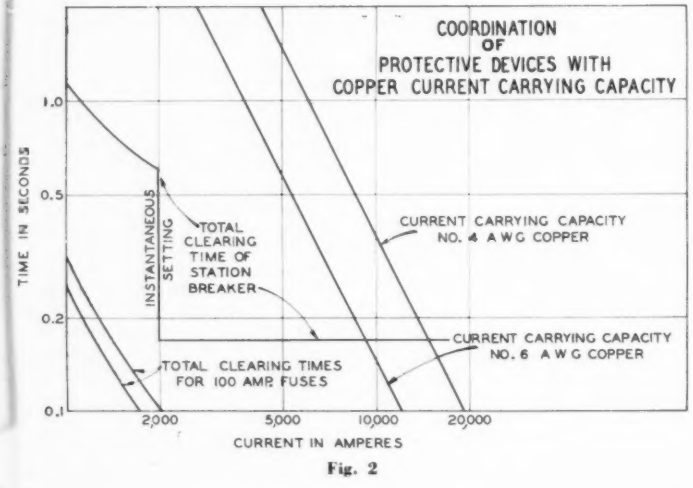



Fig. 2

# Burndowns on No. 4 and No. 6 Wire

**Experience with burndowns on circuits of high fault current capacity and preventive measures are discussed by two distribution engineers**

Valuable operating experience with No. 4 and No. 6 wire on distribution circuits of the high-fault capacity was contributed by H. E. Jung, chief distribution engineer of the Southern California Edison, and T. A. Bettersworth of the Pacific Gas and Electric Co. at a recent meeting of the Pacific Coast Electrical Assn. Jung said, "Until about twenty years ago on 4-kv. circuits we experienced many burnopens and burndowns because of relatively close, 12 in. conductor spacing. This was increased to 20 in. for standard construction and troubles were decreased to a point where greater spacing could not be economically justified. Edison's minimum spacing for 11-kv. and 16-kv. circuits has been 36 in. for about twenty-five years. No undue amount of burndowns or burnopens has been experienced because of small conductors swinging together.

The bulk of the Edison system is in light loading area and we design for 10,000 psi. with copper sizes No. 6 and No. 4 at 70° F. A survey covering the past two years indicates somewhere in the neighborhood of 60 cases of faults in the 11-kv. and 16-kv. circuits where conductors have burned down or burned open. The exact number would require a thorough search of records and then might not be precise. Distances of the faults from substations varied from 1,500 ft. to eight miles.

The largest number of faults resulting in burndowns were in areas that had many trees and the fault locations generally were two miles or more from substations. In 40% of the cases the wires burned down at the location of the initial fault. In 80% of the cases where wires were burned down or open there were taps that burned open at connections between the substation and the initial fault. These burnoffs were of course merely high resistance joints which failed because of the high surge current drawn by the fault.

The Edison company has had no reported cases of conductors swinging together as the result of the repulsive effect of mutual inductance because of heavy surge currents.

Jung's conclusion was that, in any case of swinging together of conductors as a result of heavy surge currents, the possibility of contact would be a function of wire size, tension, spacing and current, with heavy emphasis on adequate spacing as an important factor to prevent contact.

### PG and E Experience

The problem was attacked by Bettersworth from the standpoint of determining the extent and causes of conductor burndowns from high fault currents and the methods of preventing or minimizing such occurrances.

On the PG and E system there are substation banks as large as 75,000 kva. supplying 12,000-volt distribution. Interrupting duties of the order of 10,000 amp. are not uncommon on the system. Fig. 1 shows the maximum fault current at various distances from large distribution substations on a 12-kv. circuit of No. 4/0 copper. An interrupting duty of one million kva.,

on the high-voltage bus at the station was assumed. At the station low-voltage bus the available short-circuit current ranges from approximately 10,000 amp. for a 20,000-kva. station, to 25,000 amp. for a 75,000-kva. station. The short-circuit duty on the line drops off rapidly as the distance from the substation increases. At one mile the range is 5,000 to 7,000 amp., at four miles it is 2,000 to 2,300 amp.

Heavy fault currents have caused burndown of light conductors in various ways, including the following:

1. Burndown at the point of fault caused by arcing or high resistance contact. Burndowns from this cause seem to be more common on weatherproof conductors, apparently because the arc tends to concentrate at one point on covered wires but travels along the span on bare wires.

2. Burndown caused by arcing in other spans on the source side of the fault is a consequence of opposite phase conductors being pulled together by the magnetic force of the fault current. Cases have been reported where a series of several spans were burned down in this manner.

3. Burndowns caused by excessive heat concentration in high resistance joints. This has been one of the most common causes of burndowns. It occurs in twisted sleeves, compression splices, split bolt connectors and switch terminal clamps. This type of failure is particularly prevalent on old lines where the original joints have deteriorated because of corrosion and where repair splices and new taps have been installed without proper cleaning of the conductor.

4. Burndowns caused by overheating throughout the length of the conductor. This type of burndown is included because it is theoretically possible, although in practice it is improbable. No actual instances have been found. It can only be expected to occur in a line where there are no bad joints, where there is no arcing or excessive resistance at the point of fault and where the clearing time on the protective devices is sufficiently long to permit softening of the conductor.

Such are the various ways in which conductors can burn down. How can such burndowns be prevented or minimized?

### Remedial Measures

One method would be to use larger conductors in areas where fault currents are high. This may be justifiable very close to very large stations, but the general application of this solution would be quite uneconomical. Many burndowns can be eliminated by more careful joint construction. Joint construction has been the subject of numerous recent papers in the industry and it will not be discussed in detail here. It involves the use of suitable connectors and splicing sleeves, thorough cleaning of the conductors, and the use of oxidation inhibitors. The importance of this point cannot be overemphasized. Operating men are familiar with the practical difficulties of obtaining 100% performance in the field.

The general method of minimizing burndowns is fast clearing of heavy faults. Fig. 2 illustrates the principles involved and the methods used by PG and E. The two straight diagonal lines represent the short time current carrying capacities of No. 4 and No. 6 copper. These curves are taken from the June 1928 issue of the *General Electric Review*. They represent the type of burndown that does not occur; i.e., straight resistance heating of the conductor. The other types of burndown are not susceptible to theoretical analysis, so these curves must be used as an index, keeping in mind that the actual burndown curves are some unknown distance to the left of the one shown.

### Instantaneous CO Trip

With PG and E it is standard practice to provide an instantaneous trip attachment for the feeder overcurrent relays. The current setting of the instantaneous trip is determined by the circuit characteristics and is generally quite high. There are still many circuits on the PG and E system that do not have the instantaneous trip attachment. On some circuits the instantaneous trip cannot be used or must be set excessively high because of the necessity for coordination between the station breaker and other breakers on large industrial services connected to the feeder. However the instantaneous trip is provided on all new feeder installations and is used to the extent that circuit conditions permit.

The irregular curve of Fig. 2 is typical to the total clearing time for the breaker on a heavy 12-kv. circuit. The instantaneous trip is set for 2,000 amp. The breaker is an 8-cycle design and the relay time is about two cycles for instantaneous trip, giving a total clearing time of ten cycles for currents exceeding 2,000 amp. Theoretically this will protect No. 6 copper against fault currents up to 9,000 amp. and No. 4 copper against currents up to 14,500 amp. Actual values will be less if there are any high resistance joints or if there is any arcing or contact resistance at the point of fault. Experience seems to indicate that the instantaneous trip is fast enough to prevent burndowns resulting from fault current pulling the phases together. In the only cases of this sort that have come to our attention, the relays were not equipped with instantaneous trip attachments.

### Sectionalizing Fuses

A faster method of clearing heavy faults is the use of sectionalizing fuses at the point where the small conductor is tapped to the main line. This method has been used extensively by PG and E, although not to the full extent that it could be used to advantage. The total clearing time curves for two types of 100-amp. fuses are shown at the lower left of Fig. 2. These fuses are probably fast enough to clear any fault before burndown occurs in any one of the four ways previously described. Fuses smaller than 100-amp. rating would, of course, clear faster. The curves for 75-amp. fuses would be completely off the curve at the lower left.

Unfortunately fuses are available only in limited interrupting capacities. The fuses represented in Fig. 1 are the universal link type and the S&C liquid-filled fuse. The interrupting capacities of these two fuses are shown on Fig. 1 in relation to the interrupting duty at various distances from substations of various sizes. The Universal link fuse used in an expulsion-type cutout has an interrupting capacity of 2,000 amp. at 12 kv. At distances of less than 4 to 4½ miles from the station the interrupting duty exceeds the interrupting capacity of this fuse. The liquid-filled fuse has the highest interrupting capacity of any used by PG and E. It is one of the highest interrupting capacity distribution fuses available. Its interrupting capacity at 12 kv. is 7,400 amp. This is adequate for all but the first one-half mile to one mile of these circuits. On circuits of smaller conductor these distances would be correspondingly less. There is, however, a small area close to large substations where fuses do not have adequate interrupting capacity and where instantaneous trip breakers may not be fast enough to prevent burndowns. In this area the risk of burndowns must be accepted or an attempt made to establish a minimum conductor size large enough to avoid burndowns. Considering the various ways in which burndowns occur, it may be difficult to determine what the minimum size conductor is.

In summary, PG and E had considerable amount of conductor burndown trouble of at least three of the four varieties described. Confidence is felt that by more extensive use of the preventive methods discussed the number of such burndowns can be greatly reduced.

# H-F HEATING MAKES

The sharpening and resharping of drill bits has always been the source of great expense and worry to the mining and construction industries. Until recently this work was done by the blacksmith, his forge and his hammer. A new high-frequency heat-treating method is being used to great advantage by the Western Rock Bit Mfg. Co. of Salt Lake City.

For the drilling of holes for blasting, the mining and construction industries are generally adopting what is known as the single-use detachable rock drill bit. Some two years ago there was introduced to the Western United States the Liddicoat detachable rock drill bit. The objective was to provide the mining industry with a low-cost production tool that is used to destruction and not resharpened. This principle has made it possible to supply miners with a uniformly factory-hardened drill bit designed for maximum cutting efficiency.

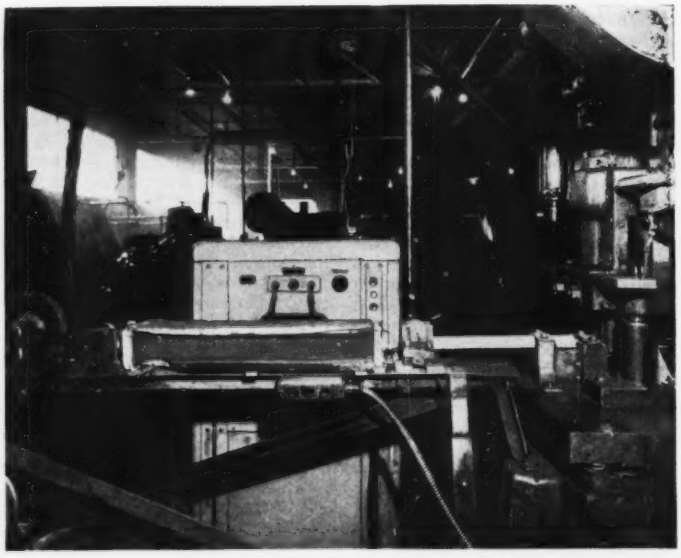
In the summer of 1948, the Western Rock Bit Mfg. Co. started a production of the Liddicoat bit. The factory building in Salt Lake City houses some of the most modern high-production rock bit manufacturing equipment in this country. All steel is heated by Tocco high-frequency induction generators producing power at 10,000 cycles. This equipment permits maintaining even temperatures, which is of the utmost importance in the forging and heat-treating of shallow hardening steel. Bits are forged to exact tolerances in heavy high-speed process, which eliminates all hand machining operations. The equipment, being mainly automatic in operation, assures a bit of unvarying good quality.

The basic steps in the manufacturing processes are: (refer to schematic diagram):

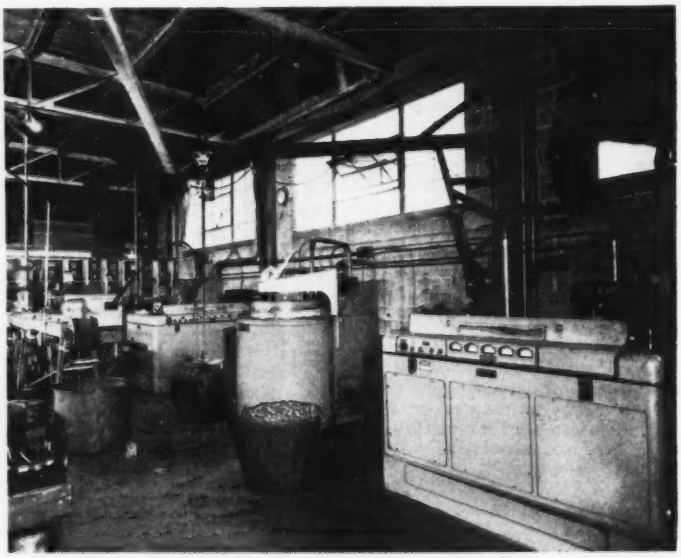
1. (Picture 1) — Rods approximately 1 1/6 in. are cut into billets varying in length according to the size of bit to be forged, at the rate of 3,000 an hour. The operator introduces the rods to a feeding mechanism that automatically forces them through a multiturn copper coil through which water passes. That portion of the rod which passes through the coil is heated to approximately 1,200° F. and is sliced to the proper length by a cutoff press. The coil carries 10,000-cycle current generated by a 150-hp. water cooled generator.

2. The slugs are tumbled to remove feather edges.

3. (Picture 2) — The slugs are passed through a 10,000-cycle induction coil, 16-in. long, 4½ in. high, and 4½ in. wide, at the rate of 16 a minute. The slug is heated from room temperature to a forging temperature of approximately 1,950° F. The slugs emerge from the heating coil and slide down a chute to the forge operator, who introduces with tongs the hot slug to the dies of a 500-ton high-speed forge press. The hot steel is subjected to tremendous pressure which extrudes the bit into the desired shape. This method preserves the grain of the steel, flow lines being compressed rather than cut across as is usual in forgings



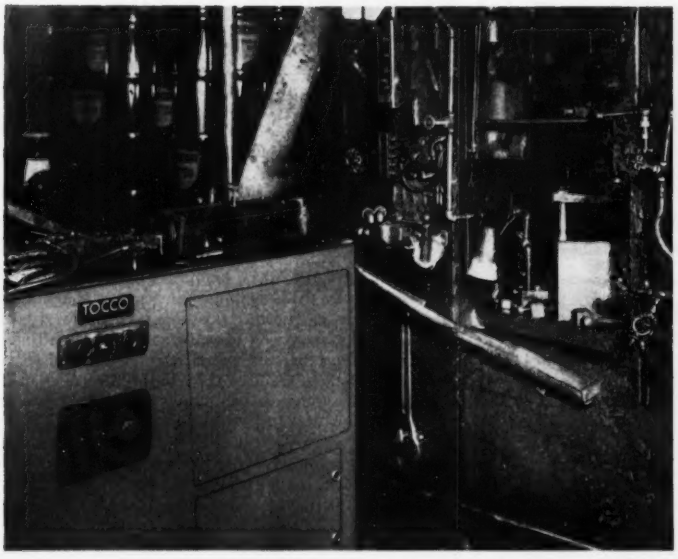
1. Rods are cut into billets and forged in 150-hp., 10,000 induction furnace



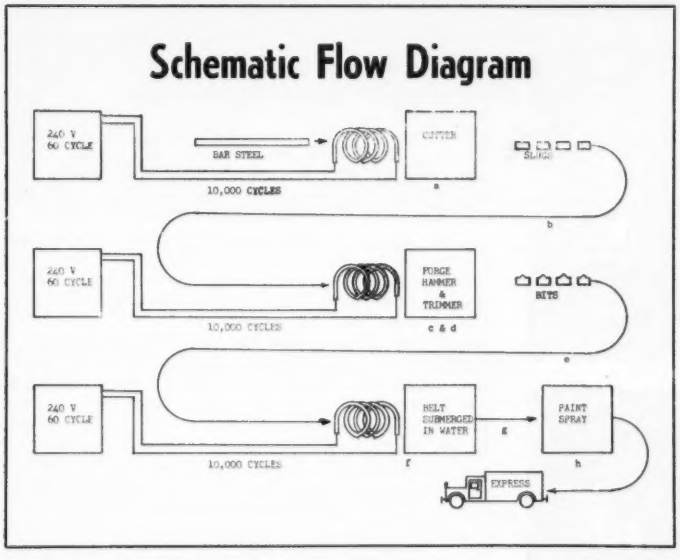
3. After cooling to room temperature bits are then placed in 52-kw. draw furnace

# SUPERIOR ROCK DRILLS

**Donald C. Thomas**
Utah Power & Light Co.
Salt Lake City




**2. Slugs are passed through 10,000-cycle induction coil, which heats to 1,950° F**




**Flow diagram showing how induction furnaces enter into manufacture of rock bits**

of this type. The retention of the unbroken grain and the compression of the material give the Liddicoat bit an unusually strong material structure.

4. The bits are then passed to the trim press where the operator trims them to the exact gage and stamps in the water hole while the bit is still hot.

5. Because of the closely controlled temperatures possible with the induction furnace, there is only slight oxidation from forging. This slight oxidation is removed prior to heat-treating by a grit slinger machine.

6. An operator places the bits in a trough where a mechanical feeder pushes them through a multiturn copper coil. This raises the bit from room temperature to some 1,450°. The coil unit is 20 in. long by 7 in. square. As the bit emerges from the coil, an operator places it on a moving stainless steel conveyor that carries it through the quenching medium, the depth of which is controlled. The rate of hardening varies with the size of the bit, but averages 22 a minute.

7. (Picture 3)—At the end of the conveyor the bits drop into a basket. The bits cool enmasse at room temperature, and the basket is then placed in a 52-kw. draw furnace where they are held at low temperature for a predetermined period.

8. For painting and visual inspection, the bits are placed on spindles that carry them through a paint spray. Here they are painted to identify the size. Metallurgy and hardness tests are made at half-hour intervals during the entire hardening cycle so that bits of uniformly high quality are delivered.

### Many Advantages

High-frequency induction heating for forging and hardening of the bits has many advantages. Heat treating is uniform. The operating being largely automatic, the bits are identical in size, shape and hardness, and of superior quality. Floor space is saved; production per man is higher and fewer men are required. Working conditions are pleasant and cooler than if other methods were used. To heat the steel by any other method would require large gas- or oil-fired furnaces. This process would require four furnaces.

Production data for March 1950: floor space, 7,000 sq. ft.; number of bits per day, 19,000; number of bits per month, 400,000; types of bits, 5; sizes of bits, 48; number of working shifts, two for forging and three for production of slugs; rate of cutting slugs from steel rods, 3,000 per hour.

Electric operating data: connected load, 460 kw.; delivery voltage, 4,000 kw.; maximum demand, 336 kw.; kwh. used, 98,000 per month; load factor, 40.5%; cost per kwh. 1.258c; number of bits per kwh., 4.8 bits; power cost per bit produced, 2.7 mills.

# Planning and Control For Seeing Tasks

Planning an adequate lighting level for various seeing tasks in a plant the size of Zellerbach Paper Co.'s new Sacramento house requires that the engineer know the type of work done, the routine and working arrangement. T. O. Gerlishe, consulting electrical engineer, calculated carefully, balancing one type of system against another to obtain optimum glareless light for each area.

The one-story, 154,000-sq. ft. building uses 15,000 of it for offices and display space, the rest is warehouse. Light colors create an atmosphere of efficiency and give a high reflection factor.

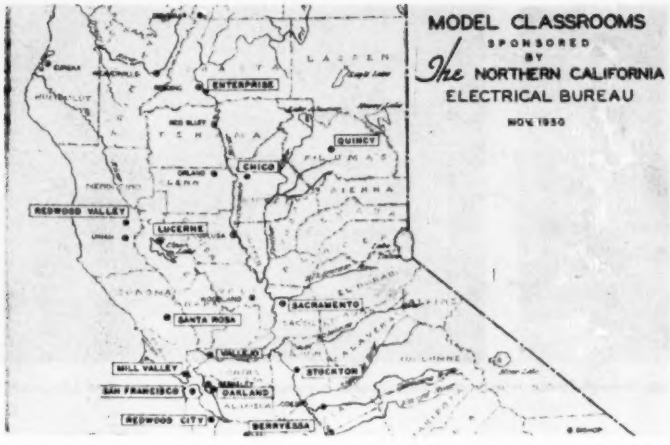
In offices and display areas, troffers were deemed desirable on account of a 10-ft. ceiling, but because of inherent brightness at that height the close spacing necessary to get 50 f-c caused comparison of white reflectors with those using Alzac. White reflectors would have required a spacing-to-mounting-height ratio of 0.55 to 1; Alzac 0.9 to 1 and the ceiling between rows would appear lighter because of lower brightness of the Alzac. So 96-in. slimline 4,500° K white lamps, operated at 300 ma. in Alzac louvered and reflected troffers, were employed.

Structural bays in the warehouse measured 50x40, with the lower chord 20 ft. high. To follow customary practice would have required industrial reflectors with a ratio of spacing to mounting height of 1 to 1, or one to each 400 sq. ft., nearly 350 reflectors and outlets. Instead industrial fixtures of optical glass with extensive controlled distribution could be used with a ratio of 2 to 1, because the reflector has a 30° shielding angle.

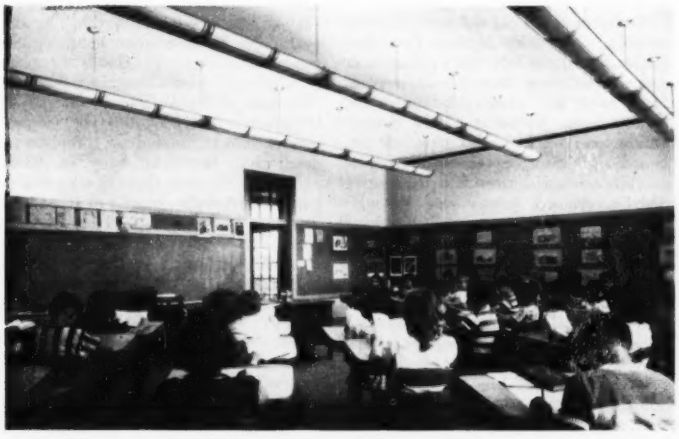
Modern glass partitions throughout the offices made use of conduit for 120-volt switch legs impossible. Framed in 1⅝-in. jambs, the third dimension very nearly disappeared. The only solution lay in low-voltage switching, using two-position momentary contact toggle switches in the offices, and mechanically latched contactors, located in the center of each area, in the warehouse. The momentary contact push buttons were located conveniently near the limits of each section's activity.

In the offices, the carpenters cooperated with the electricians and cut grooves and holes for the switches in the jambs in which to conceal the 300-volt plastic wire, stapled to the joists. Transformers were mounted in each lighting panel and secondaries run to the relays. "Although the control circuit for the most part is inaccessible," says Gerlishe, "there is no sound reason to believe that, during the normal life of the building, there will ever be any need to do any maintenance on that wire. The relays and switches are readily replaceable." Grason Electric made the installation.

In order that all circuits, except the night panel, can be de-energized at night, there is a 300-amp. mechanically latched contactor in the bus dividing the office from warehouse load. Main panel has a 600-amp. breaker and 19 branch circuit breakers. Service is 120/208, three phase, four wire to main breaker through bus duct. As outside salesmen have occasion to work at night, the night circuit breaker is actuated by a momentary contact push-button station at the employees entrance. Night lights and floodlights are on astronomical time switches. Clock circuits are continuously energized and controlled from a separate panel.




**Towns in northern California where model installations were made by 1950**



**Remodeled classroom at Curry School, Vallejo, which launched a complete**

# City-Wide School Modernization

How long does it take to bring results in a school lighting program? Three years of groundwork in an industry effort to stimulate better school lighting in northern California were required before a major achievement climaxed on Nov. 6. Then the board of governors of the Vallejo Unified School District voted approval of a master plan for modernization of 334 classrooms in 18 elementary and high schools of the district. The board authorized the superintendent of schools to proceed with execution of the master plan. It also directed that plans for future school construction shall be reviewed by lighting engineers to insure adequacy of provisions for illumination.

The Vallejo district includes three other schools, all recently built, one of which already meets the desired lighting standard. The remaining two so nearly approach it that their relighting will be deferred until the 18 older schools have been modernized. On completion of the program Vallejo is expected to be the first city in northern California to have every classroom brought up to minimum modern standards for visual environment.

The decision to relight all schools of the district to meet requirements of the American Standard Practice for School Lighting is the outgrowth of the modernization of a demonstration classroom at Curry Elementary School in Vallejo. This project was undertaken as the most recent step in a continuing program that has been in operation since 1947. Concrete results from the program already had been experienced in San Joaquin County, at Oakland and at Santa Rosa.

The project in the three-year promotion has been carried primarily by the Northern California Electrical Bureau, which has sponsored the relighting of 12 of the 17 model classrooms so far completed, donating the fixtures and enlisting donations of other materials. The Curry School lighting was sponsored by the Vallejo Electric Light and Power Co., donor of the fixtures. Pacific Gas and Electric Co. gave fixtures to aid in relighting two rooms in San Francisco. The Sacramento Municipal Utility District sponsored the relighting of two rooms in Sacramento, fixtures being donated by the General Electric Supply Corp. In every case, assistance has been had from various business firms.

### Initiation Reported

The initiation of this program was reported by ELECTRICAL WEST in the June 1947 issue, when the relighting of a classroom at Oakdale School in Chico was described. Since then rooms have been brought up to standard at Enterprise School near Redding, Commodore Stockton School in San Francisco, Lincoln School at Sacramento, John Gill School at Redwood City, Oakland High School, Lafayette School at Stockton, Pioneer School near Quincy, Park School in Mill Valley, Lincoln School at Santa Rosa, Berryessa School near San Jose, Lucerne School in Lake County, Redwood Valley School in Mendocino County and Curry School, the latest, at Vallejo. Interested by the program, Stanislaus County undertook to modernize a demonstration classroom at Ceres.

John S. Walsh, chief illuminating engineer of Pacific Gas and Electric Co., has been a driving force behind the plan since its beginning. An address he made at the annual meeting of Colusa County school trustees at Colusa in 1947 touched off a discussion that led to adoption of the program. Dr. Charles Bursch, chief of the Division of School House Planning

**Before remodeling the Commodore Stockton School in San Francisco (brightness measurements in figures) and afterwards**

of the State Department of Education, was present at the trustees' meeting and lent official support when the Northern California Electrical Bureau was approached to undertake sponsorship of the plan. After two years of operation, school officials had opportunity to see results of the program when a display was placed on exhibit at the 1949 annual convention of the California School Administrators Assn. in Santa Cruz. The display consisted of a model of an old-fashioned school, complete with belfry, which served as background for a screen on which a series of 48 Kodachrome pictures was projected from within.

### Selected for Location

Schools relighted in the program purposely have been selected for their central location, where trustees and administrators from other school districts of the county might conveniently view the demonstration room. The consent of the school board and school superintendent to modernization of one room for the purpose has been obtained and the project carried through as a cooperative effort of the board and the sponsoring organization.

In the pattern that has developed as the program has progressed, open house has been held by a number of the schools to provide public opportunity for inspection of the newly relighted room. Printed invitations have been mailed to trustees and school administrators of all school districts in the county and sometimes in adjacent counties. News releases with mats have been mailed to all newspapers in the area. Mimeographed explanations of the principles observed in the relighting have been prepared for distribution to visitors and the lighting engineer who designed the particular installation has been present to answer questions. The Parent-Teacher associations have assisted by providing refreshments and the children and their teachers have presented programs.

At Lucerne School the occasion was made a community festival. Civic organizations joined in the preparations and a barbecue dinner was served. More than 400 visitors attended the Vallejo open house at Curry School on the evening after the action of the board of governors in approving a similar modernization for the entire district. Among guests was Roy H. Bragg, vice-president and assistant general manager of Vallejo Electric Light & Power Co., who was the leading spirit in the relighting plan.

At Santa Rosa a bond issue which included $150,000 for refinishing and relighting 120 classrooms was approved by the voters four days after an open house at Lincoln School. In Stockton the two classrooms relighted at Lafayette School encouraged the board to decide on the immediate relighting of three complete schools—Eldorado, August and Jackson—with a total of 50 classrooms, as part of a larger, long-term program. The model classroom in Oakland resulted in the relighting of Oakland High School and the specifications of nine 500-watt incandescent fixtures per classroom for new school construction in the city.

The program has been successful in one of its primary aims, to demonstrate to school authorities that older classrooms with lighting below modern standards can be brought up to requirements of the American Standard Practice for School Lighting, which was developed by the Illuminating Engineering Society and approved by the American Standards Assn. at moderate cost. It has shown convincingly that schools can be made thoroughly modern from the standpoint of visual environment at far less cost than new construction.

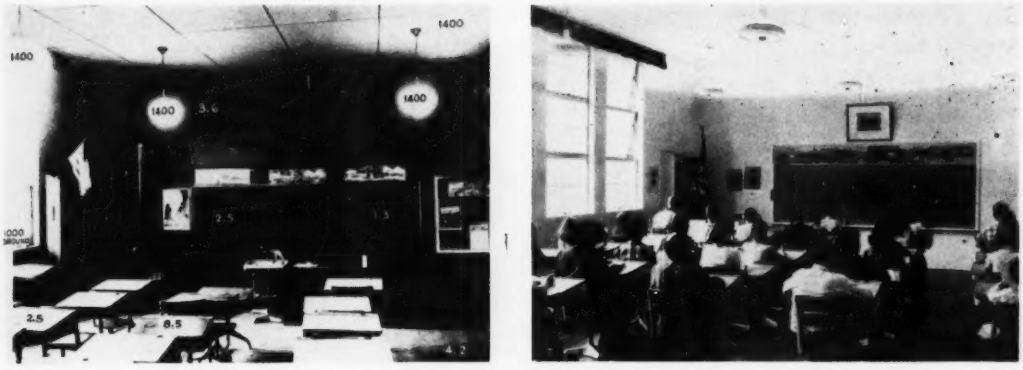
Although materials and some labor have been donated and the cost of the demonstration rooms to the individual schools has been negligible, careful cost records have been kept for the guidance of school officials in planning general modernization programs. The cost of the Vallejo program will be approximately $1,100 per elementary classroom, including complete redecoration, the refinishing of floors and desks, replacement of slate blackboards with light-colored chalkboards, hanging of new shades for daylight control as needed, necessary additional wiring and the installation of lighting fixtures to provide a minimum value of 30 f-c of light at the desk level.

### Two Sources Used

Incandescent and fluorescent light sources have been employed about equally in the 17 classrooms so far modernized in the three years of the program. The recommendation in the master plan for Vallejo is for the use of incandescent fixtures to produce 30 f-c of light in the elementary schools and fluorescent to produce 50 f-c in the high school classrooms. At 50 f-c the heat generated by incandescent fixtures would be excessive.

It was recognized also that the greater nighttime use of high schools for adult education and student extracurricular activities provides more opportunity to amortize the higher cost of fluorescent fixtures. As compared with $1,100 for the elementary school rooms, installation of fluorescent sources in the high school rooms will cost an estimated $650 for 50 f-c of illumination.

The latter level has been recommended in the master plan because eyes need more assistance in seeing




**Typical old country school, the Pioneer School at Quincy, before and after, shows what a room modernization does for it**

as people grow older, and inadequate lighting of high school classrooms has often precluded their full use for adult evening courses. One survey reported at the start of the demonstration relighting program showed that 9% of grade school children had defective vision, but this figure increased to 25% of high school students tested.

The incandescent sources used all have been 500-watt silver bowl lamps in concentric ring louver fixtures suspended nine to a room, a total of 4,500 watts power consumption. Ring louver fixtures were chosen because of their ease of cleaning and relamping—and it was not overlooked that they offer a minimum target for paper wads. Fluorescent fixtures have been luminous indirect types with 96-in. T-8 slimline lamps, mounted in continuous rows. Luminous indirect fluorescent units are recommended since they produce the same soft shadowless quality of illumination and low-purpose brightness as the ring louver incandescent units with silver bowl lamps.

In connection with redecorating for high light reflectance values, six attractive color combinations were developed from studies conducted jointly by J. S. Walsh, Doyt Early, architect of the State Division of School House Planning, and N. E. Zavalishan Jr., architectural representative for the W. P. Fuller Co., which has donated the paint for most of the demonstration rooms. The basic wall colors are tropic green, iris blue, surf, sunlite, dawn gray and camellia. To facilitate choice by school authorities, color chips were mounted and the samples bound with necessary information in a neat presentation folder.

Old-fashioned slate blackboards have been decisively discarded in the new color plans. Son-Nel Products Co. of Oakland was induced to develop chalkboards in colors to harmonize with the six decorative schemes and has presented the boards to the schools relighted. The colors are olive green, coral, powder blue and two shades of brown. They are dark enough for writing in white or suitably colored chalk to be easily read but are light enough to minimize brightness contrasts with the wall, and they contribute to the cheerfulness of the room as well.

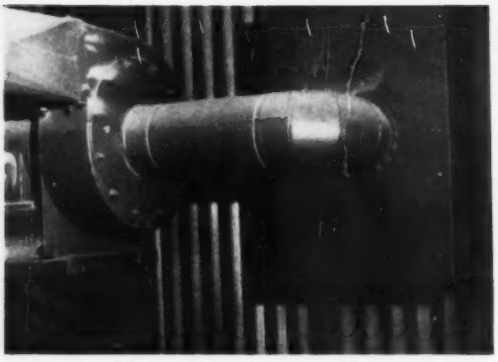
Desks and floors have been refinished in light, natural colors to reduce brightness contrasts. Where floor covering has been used, the color has been coordinated carefully with the color plan of the room. Window walls are painted white like the ceilings to reduce contrast with natural daylight seen through the windows. Venetian blinds have been installed in several of the rooms for improved daylight control.

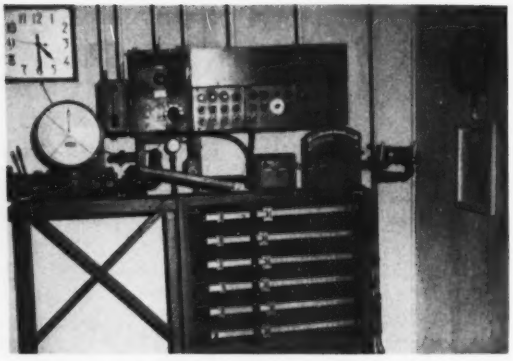
### Response Good

One reason for the snow-balling proportions of the bureau-sponsored demonstration classroom movement has been the enthusiastic response of both teachers and pupils in their new environment. "The transformation and display of our classroom was a great source of pleasure to the children and to me," wrote one teacher to the bureau. "And of course the happiness of spending our days in such a cheerful room will continue on through the months to come." The second grade children of Lincoln School, Santa Rosa, wrote an appreciation that was published in the Santa Rosa *Press Democrat:* "We like to work in our room because our room is nice . . . We like our new lights too. They are good for our eyes." More important, the school trustees and administrators from surrounding districts of the various counties have been impressed through the medium of the open house visits. These have publicized the program among educators and have created a ready acceptance of proposals for additional demonstration lighting projects in other counties.

The demonstration relighting program is an intelligently planned and vigorously executed method of stimulating improved school lighting in northern California. One aspect of the need for a higher level of artificial light was pointed out by Dr. Bursch when he reported results of a survey of elementary schools as follows: "In connection with the natural lighting of schools the survey found 34% of the classrooms having window area less than 1/6 the floor area, and an additional 24% of the rooms with window space less than 1/5 the floor area. Good practice today provides the equivalent of 40% of the floor area in glass." Relighting to specifications of the American Standard Practice for School Lighting offers the means providing these older classrooms with good illumination.

An estimate compiled from reports of the State Department of Education and other sources places the total number of classrooms in California as a whole, public and private and from elementary through university level, at 50,000 rooms, of which an estimated 90% need relighting. For northern California only, electrical industry participants in the demonstration program estimate, modernization of old classrooms alone could result in more than $5,000,000 in fixture business, $2,000,000 in rewiring and an additional $250,000 in annual lamp sales. While the demonstration lighting program is aimed at promoting realization of this potential business, it wisely is being conducted in such a way as to convince school authorities that the children themselves will be the final real beneficiaries.





With a motor pressure blower system, left, and electronic feed mix control, right

# Modern Ranch is Scientific

Raising of prize cattle is done with scientific accuracy nowadays. At San Juan Hereford Ranch, near San Juan Capistrano, owned by Charles Krum, son of the inventor of Teletype, electricity measures and mixes feed formulas accurately in a modern mill, designed by Western Engineering Co.

Jerry Cole, San Juan Electric Co., had two problems to solve. First was to sell a quality installation from a sketch and a list of motors against price competition. Second was to prove over-all savings from a dust and explosion-proof installation. The motors obtainable at the time were not explosion proof. New end bells were unobtainable. There was a deadline on the completion.

He called in John C. MacFarlane, electrical engineer of Santa Ana, who recalled a conversation at an inspectors meeting and solved both problems by designing a blower system and hoods to keep the motors under positive air pressure, thus blowing out against any possible entry of hay dust into the motors.

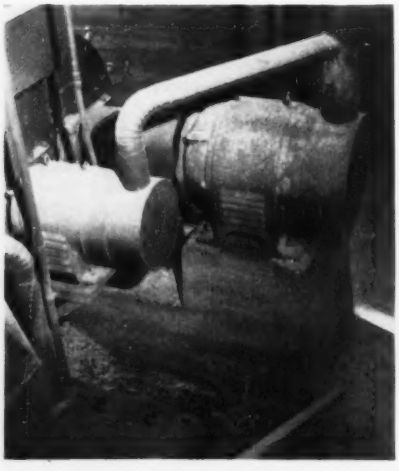
The resulting installation, illustrated here, accompanied by gasketed panelboards, brought a reduction in insurance premiums for the plant that paid for the electric installation in about a year.

Fortunately all control relays were cascaded to provide selective operation of the two parts of the mill—that for hay grinding, and that for mixing hay, grains and other nutrients into measured batches of feeding formula. Interlock to shut down all motors ahead of any given operation was already included. The blower fans then were also interlocked to operate whenever certain parts of the plant operate. Air intake is from the outside. The air is filtered of dust before being pumped into the electric motors, both to cool them and keep dust from entering.

Control of the mixing is electrical and automatic, the design of W. C. Hatfield, assistant manager of the ranch and a former electronics engineer. At a control panel in the mill office six sequences of mixing can be set up in advance by push buttons for operating the feed mixer, horizontal drag, elevator, surge bin with molasses mix, conveyor and final feed drag. Batches of 1,000 lb. are made up and poured through air-pressure-operated bin gates into preselected bins.

There are seven bins to hold the batches used for each day's feeding, and an eighth or spare bin to take automatically any overflow. Ahead of these there are also six storage bins to contain the ingredients of the mix. Each of the latter is connected to a weighing beam. A gravity indicator is controlled by an oscillator, electronically coupled in series with a relay that feeds the starter button. As the flow of an ingredient for a batch reaches the preset weight and the indicator comes to zero it automatically shuts off the flow of that preselected grain or food concentrate.

Trucks drive up to the hoppers from the completed mix bins and are loaded with the batch designed for a particular herd in a given corral or pasturage. Records are kept of the diet fed each herd for comparison of the efficacy of the formulas used. With this electric control two men operate the entire mill and feed 800 head of prize cattle.



Air pressure hoods on motors, left. Gasketed main switching panel, right

# NORTHWEST ELECTRIC LIGHT AND POWER ASSOCIATION

## *Utilization Data Sheet No. 76*

SUBJECT: Electric Bread Baking Oven
CUSTOMER: Silver Loaf Baking Co., Spokane, Wash.
TYPE OF BUSINESS: Bakery
SERVICE COMPANY: Washington Water Power Co.
DATA PREPARED BY: W. A. Newman

### Description

The Silver Leaf Baking Co. of Spokane operates a completely electrified bakery. Included is a large Rainier tray-type bread oven, subject matter of this data sheet. Equipment includes an automatic unloader feature and a conveyor carry-away system.

### Advantages

The original installation used oil. Electrical equipment was installed because of efficiency, uniformity of product, cleanliness, and labor savings.

### Conveyor System

While still in the oven, the automatic unloader tips each tray to approximately a 45° angle. This causes the bread pans to slide forward onto a metal conveyor, which conveys the bread to the exterior of the oven. From here another 15-ft. metal conveyor takes the bread to a point where it is manually depanned onto a 65-ft., 24-in. wide belt conveyor. This conveys the bread to a turntable in another room where it is manually stacked in racks and pushed into the coolers. From here the cool bread is processed through three automatic slicing and wrapping machines; then conveyed on three 18-in. Union conveyors, each 250 ft. long, to the trucks which take the product out of the plant.

**Operating Data**

| | |
|---|---|
| Sweet goods oven | 250 kw. |
| Cake ovens | 64 kw. |
| Misc. motors, lights and donut machine | 180 kw. |
| Large bread oven | 400 kw. |
| | 894 kw. |

The following allocation of electric energy costs is based upon a billing period of five months (November 17, 1949 to April 17, 1950).

Total of all electrical energy used this five-month period: 162,600 kwh. —660 kw. demand—$1,517.90 making an average rate of 9.33 mills a kwh.

Submeter for sweet goods oven—34,160 kwh.

Submeter for cake ovens—7,200 kwh.

Submeter for bread ovens—90,200 kwh.

Balance used for light and power—21,040 kwh.

### Net Cost for Bread Baking

Total electric bill was $1,517.90 for 162,600 kwh. on maximum demand of 660 kw. Cost of power and lights and heating of ovens for cakes and sweetgoods was $825.70 for 72,400 kwh. on maximum demand of 350 kw. (This computation indicates amount of charge for power and lighting, etc., without large oven).

Incremental balance chargeable to bread baking—$692.20

Hence 90,200 kwh. for bread baking costs $692.20, or an average of 7.6 mills per kwh.

Cost per 100 one pound loaves at 100.22 watt-hours per pound—7.61c per 100 lb.

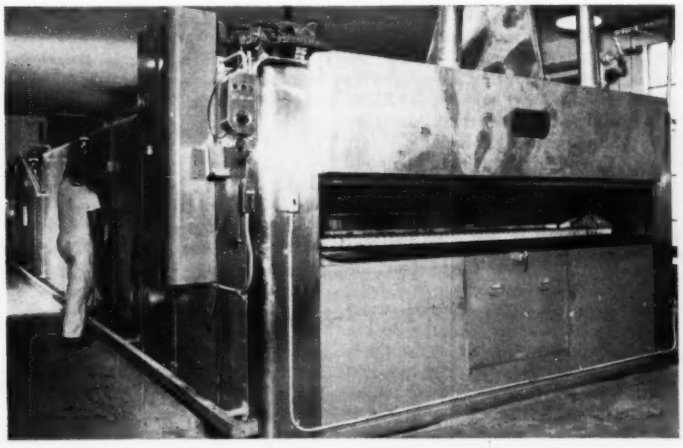
### Oven Efficiency

Metered electric service used converted to B.t.u.'s=341.95 B.t.u. per loaf of bread.

B.t.u.'s theoretically required to bake a one pound loaf of bread at 100% efficiency =235 B.t.u.

Hence present over efficiency = 235 or 68.72%

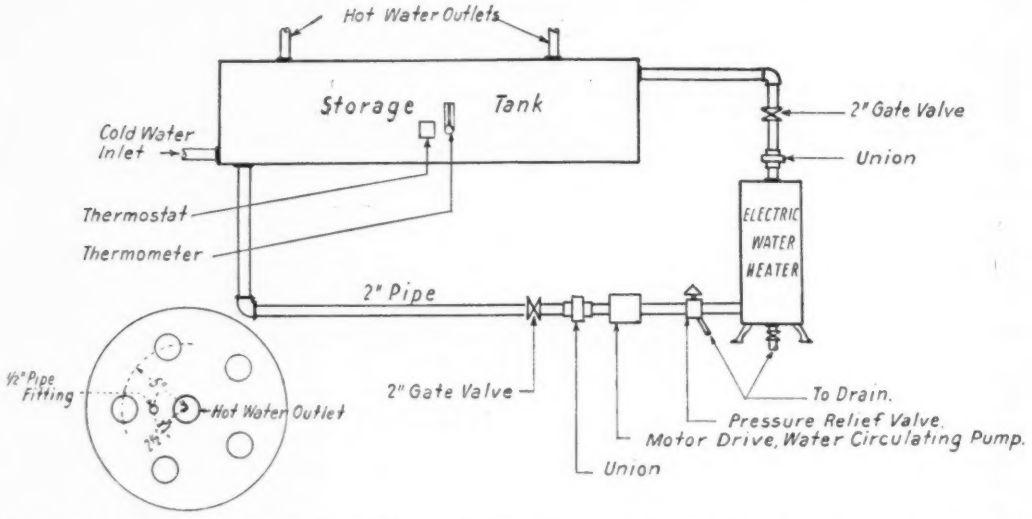
341.92



# NORTHWEST ELECTRIC LIGHT & POWER ASSOCIATION

## Utilization Data Sheet No. 77

SUBJECT: Electric Water Heating at a Coal Mine
CUSTOMER: Liberty Fuel Company, near Helper, Utah
TYPE OF BUSINESS: Coal Mining
SERVICE COMPANY: Utah Power & Light Co.
DATA PREPARED BY: W. L. Faddis, division sales manager




**Schematic of electric water heater installation at coal mine which saves operator $5 a day despite a free coal pile**

### Description

This industrial water heating installation is at a large coal mine operated by the Liberty Fuel Co. The hot water is used for shower bath purposes for the benefit of the workmen. The installation consists of an insulated 30-gal. heater tank equipped with five electric immersion heaters and an insulated storage tank. The storage tank is 42 in. in diameter and 12 ft. long, lying horizontally, capacity is about 1,000 gal.

### Former Method

Water was formerly heated by a coal-fired steam boiler. This required one workman part time. The Liberty Fuel Co. estimated the cost of this coal-fired method at $6 per day, all for labor since cost of coal was considered "free." The company felt that this method was too expensive and asked the utility for a proposal to do the job the electric way.

### Electrical Data

In the top of the 30-gal. tank are inserted four 5-kw. and one 3-kw. immersion electric heating elements. This heats the water that supplies the 1,000-gal. insulated storage tank. Installed in the water line ahead of the heater tank is a small circulating pump, to circulate the water in the horizontal storage tank to assure an even temperature from bottom to top and end to end. This mine is operated two shifts per day. The tipple (car unloader) is used on the first shift only. The wiring for the electric water heater is so arranged that the 20 kw. of heaters are not on when the tipple is in operation, or during the first shift. This means that it does not affect the demand. The 3-kw. heater is unrestricted and therefore adds 3 kw. to the demand. Temperature of the storage tank is controlled by a thermostat.

### Advantages

The first advantage of the electric method was a substantial saving in operating costs. The former labor cost of $6 per day was eliminated. The cost of electric energy runs about $1 per day. This means a saving to the coal mine of $5 per day. Other advantages include a constant supply of hot water at a controlled temperature, convenience, no maintenance and no trouble.

### Operating Data

| | |
|---|---|
| Connected load | 23 kw. |
| Customer's increased maximum amount | 3 kw. |
| Estimated monthly kilowatt hours | 4,700 |
| Storage tank temperature | 150° |
| Four showers use 10 gpm. of | 100° water |
| Showers used | 1½ hr. per day |

# ELECTRICAL WEST Contractors' News Letter

**QUICK NEWS ON TRENDS, LAWS, CODES, MATERIALS, EQUIPMENT, COSTS, WAGES, ETC.**

**Controls have tightened** so that most contractors now know "there's a war on." Yet this is only the beginning. As the agencies are staffed in Washington more orders and denials are being rolled out. What could be written here about them as of today might be obsolete before this is printed. Best advice today is to belong to an association that keeps you informed of these changes. The paper work, never popular with construction-minded contractors, is just beginning and you'll need guidance through it.

**No dope yet**

**Copper restrictions,** for instance, are based on pounds you used during the months of January to June, 1950. It means tracking back over your job sheets and converting various wire sizes into pounds of copper, then being sure not to use more than a percentage (in pounds) of that amount in a given period this year. It is through the mazes of such orders, forms, appeals and renegotiations that you will need to be advised accurately. As with income tax it may pay you to pay for competent help.

**Need slide rule**

**Motor Repair Shops** may be in better shape to figure their copper than contractors doing construction work. Experience with copper regulations during the last war has given them some know-how to handle the paperwork to get copper wire for maintenance and repair. NISA is keeping them aware of changes with its special reports. NECA is doing the same for contractors and Midwest Electrical Council for others. Forms and information may be obtained also from the nearest U. S. Department of Commerce office.

**Get help**

**By March** the impact of the defense program will have begun to reach the West in a way that will affect the activities of all. Until it does the best thing to do is to keep business as good as possible.

**Carry on!**

**No regional conference** will be held in the South Pacific Region of Illuminating Engineering Society, according to Carl Martin, regional vice-president. Each chapter or section in the region felt unable to handle the necessary arrangements and hence it was called off. When IES President Walter Sturrock makes his visit to the region individual meetings will be held for him in San Francisco, Sacramento, Los Angeles and Salt Lake City.

**All off**

**How is the small contractor** going to fare under the defense mobilization program? The answer to that is pretty much up to his own initiative. From the last war some of the places he can look for business were learned. For instance: plant and shop lighting modernization; application of local lighting to machine tools and various processes to speed up production; use of infrared and high-frequency heating; application of capacitors to relieve overloaded wiring. These are a few of the more obvious applications that require the know-how of an electrical contractor. Suppliers of equipment have a lot of good ideas too. If the small contractor keeps an eye for business he can largely work out his own salvation.

**Fast foot work**

**Engineers of the Westinghouse Electric Corp.** have developed a self-contained, packaged unit, air-to-air, heat pump and air conditioner. Still in the experimental stage, it may provide winter heating and summer cooling for mild-climate homes of the future.

**Coming**

**Wage scale for electricians** in Salt Lake City and Ogden goes up 10c an hour to $2.40, beginning Feb. 1. Logan rates were not raised. In the changed agreement contractors get protection of work bid before Jan. 1. The agreement also calls for hiring of a journeyman of over 60 years of age for every ten men. A general foreman classification also was added.

**Up scale**

**Fifth Annual Industrial Electrical Show** of the Electrical Maintenance Engineers Assn. of Southern California is shaping up to even more importance as a means of showing new materials and devices that will add to plant productivity and efficiency for the war emergency. It is scheduled for March 15-17, at Shrine Convention Hall, 700 West 32nd St., Los Angeles.

**Electric show**

**Home seeing**

**"One Hundred Ideas in Home Lighting"** proved a vitally interesting topic at the last meeting of the British Columbia Section, IES, is E. E. Ackland explored the subject from front door to attic and basement. He told of and illustrated many ideas for valance lights, explaining the critical dimensions for such units. Because the elected chairman, S. C. Smith, had been transferred, R. M. Campbell was appointed the section's new chairman and conducted the meeting.

**One code**

**Progress is being made** between the inspection departments of the cities along the east side of San Francisco Bay to develop an electrical ordinance that will be uniform in all respects. Two versions have been prepared, one by the Oakland department, one by Berkeley, Alameda and Albany and a meeting Jan. 15 was scheduled at which to reconcile them.

**Dates**

**Meetings**—Seventh annual Adequate Wiring Conference will be held at Cincinnati, Feb. 15-16. NECA will propose changes in the standards from an outlet specification to a use specification as more realistic. New Mexico Chapter, IAEI, holds its annual chapter meeting at Albuquerque, Jan. 12-24; has an impressive slate of speakers lined up.

**Big game**

**Roy M. Butcher,** prominent San Jose electrical contractor and chairman of the California State Contractors License Board, has taken color movies of wild game in Africa that are tops. He and a group organized a camera expedition with helicopter to take commercial movies of the game, but Roy himself took equally good shots from a Dodge truck. Showed some of them to San Francisco Electric Club recently.

**Show "samples"**

**Western Switchboard Co.,** 474 Bryant St., makers of the equipment in the new Berkeley High School auditorium, have issued an unusual brochure that serves somewhat as a catalog also of the numerous kinds of panel and switchboard equipment the company makes by illustrating actual switchboard jobs for power companies, oil companies, large stores, etc. R. R. Crooke is its manager; Charles Barkis its sales manager.

**Pictured**

**Pass & Seymour** has issued a Contractors Information Bulletin showing the way the new Camstrap operates to hold its devices snug. Slot along the opposite side provides means to twist the metal against a device to insure proper adjustment.

**New man**

**George Harder** of San Jose has been appointed the new field representative of National Electrical Contractors Assn. assisting Matt Sherwood, director of the Western office, San Francisco. Harder has been manager of the San Jose branch of C. A. Langlais Electric Co. and was president of the local contractors association.

**No retreat!**

**California Conference of NECA Chapters** met Dec. 16 with Roy Butcher, chairman of the board and Nick Morrissey, registrar of the Contractors License Board. The board men explained the work of the Contractors License Law and the improvements made to the examinations for qualifying applicants for state licenses. The conference is watching that the bidders law of California, requiring listing of subcontractors by the generals on public works, is not repealed. Next meeting is March 17 in San Francisco.

**District dates**

**District 6 of NECA** will hold its annual meeting at Sacramento, April 27-28, according to J. D. O'Connor, vice-president . . . A line constructors meeting of District 8 is being held at Cheyenne, Jan. 23. Wallace Wright, IBEW vice-president, will meet with the contractors to discuss line construction labor relations policies.

**Expands**

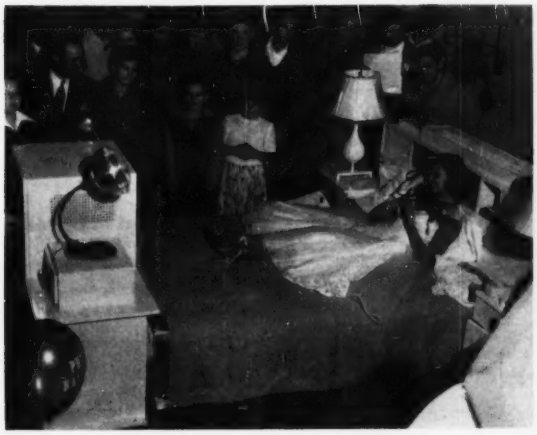
**Lavenson & Savasta,** wholesale distributors, San Francisco, moved, Jan. 1, to a new building of their own at 586 Sixth St. Twice the floor space for warehousing wiring supplies and appliances gives the firm facilities to meet the needs of industrial expansion programs in the area.

**Light measure**

**George Baumgartner,** director of engineering for lighting fixture manufacturing service at Nela Park, General Electric Co. Lamp Department, told Northern California Section, IES, of a new method of calculating lumen output. He described new automatic light measuring devices.

**By ordinance**

**"No permits can be issued** by this department for electrical installations in buildings covered by Ruling M-4 . . ." (amusements) the San Francisco Department of Public Works has ruled. No doubt other inspection departments are taxing similar action to back up the national mobilization effort.



The Magic Bed that had everything, including Miss California on it was one of the San Diego electrical show's headliners

Bob Redfield, bureau president, Joanne Durant (Miss California), J. Clark Chamberlain, and Jackie Coogan

# Heavy Buying Follows Electrical Show

From past experience San Diegans know they can expect one of the outstanding electrical shows in the country when the local Bureau of Home Appliances puts on its annual Electrical & Home Appliance Show. Last November the public once again demonstrated its overwhelming acceptance of the show when 175,000 visitors battled some of the foggiest weather San Diego has seen to get into the bureau's 13th annual show at Balboa Park.

In addition to breaking all attendance records the bureau's six-day show contributed noticeably toward lifting appliance sales out of a decided slump into heavy buying during December and developed scores of future prospects, according to J. Clark Chamberlain, the bureau's secretary-manager.

"Reddy Kilowatt's $1,000 Magic Bed" was undoubtedly the most appealing attraction. All visitors tried to get a glimpse of the versatile bed, equipped with electric bed covering, television receiver built into the footboard, overhead reading lamps, fluorescent lighting to assure proper illumination for television viewing, swivel pull-out compartment equipped with electric coffeemaker on one side of the bed and toaster on the other, clock-controlled built-in radio, built-in electric shaving facilities, electric vibrator, heating pad, sun and heat lamps. Unveiling of the "Magic Bed" at the show was the focal point of an electric bed covering sales campaign sponsored by the bureau, San Diego Gas & Electirc Co. and electric bed covering distributors in the area. Extending into mid-December, the grand prize in the campaign was the $1,000 bed. Chances were available only through a dealer's store where bed covering is sold.

Universal, General Electric, Knapp-Monarch, Proctor, Westinghouse and Everhot cooperated financially in the promotion with the utility. Participating dealers used huge window banners boosting the campaign and each store's salesmen received copies of a pamphlet on the "best electrical bed covering sales arguments." Half-way through the campaign the bureau reported that greatly increased traffic had developed in stores where bed covering is handled. At the show each cooperating electric bed covering distributor had saleswomen at the "Magic Bed" to discuss their product.

One of the most complete displays of major and small appliances, television, radio and home lighting ever assembled in the San Diego area marked this year's show as the best ever. Television exhibitors were particularly encouraged to display their models, since their business had suffered a lull from the color controversy and recent excise taxes.

An abundant supply of 1951 model electric ranges and refrigerators, many lines receiving their first public showing in southern California, brought enthusiastic response from the visitors. New products shown included two television lines—Tele-King and Olympic, also Electroway garbage disposer units. To many show visitors another attraction was the Permutit electric water softener and Pfaff domestic sewing machine. San Diego Gas & Electric's educational exhibits of domestic lighting were among the most prominent, featured among other things the "right and wrong" lighting for television and an animated adequate wiring display. Making its first appearance in the show was St. Anthony Corp.'s line of kitchen ventilators, with Jackie Coogan, ex-movie star, and now general sales manager for St. Anthony, on hand to boost his firm's products.

Other popular exhibits included the new Norge electric ignition ranges and "talking refrigerators," which gave spectators a recorded sales pitch when the door was opened.

Still another featured attraction at this year's spectacular show was Joanne Durant, Miss California of 1950, who acted as official show hostess and with Jackie Coogan helped Chamberlain in awarding the $2,500 worth of door prizes given away during the show.

**Spokane Chairman Maage LeCounte smiles as W. A. Blees tosses gauntlet to his competitors. Manager Wilkinson and speaker Randall Johnson at extreme right**

**New directors of the Inland Empire Electrical Dealers Assn. elected. Left to right, Frank Tool, secretary; Stan Densow, president; Les Barnes, vice-president; John Boothe, delegate at large; Bud Brown, director; Chuck Nelson, treasurer. Absent when this was taken were Bob Guertin and Ed Berquist, also directors**

# IEEDA—Blees, Advertising

Silk smooth W. A. Blees, Crosley sales manager and Avco vice-president, gave the Inland Empire Electrical Dealers Assn. audience of about 200 dealers, distributors and utility men and women, as startlingly frank a talk on the competitive appliance business as they had ever heard, Nov. 21, in Spokane. With disarming calmness he called on his competitors by name to pick up the gauntlet he dropped gently at their feet. He said simply but meaningfully that Crosley was after the No. 1 position in appliance sales, the top place now enjoyed by Frigidaire. As the man whose strategy had put Chevrolet ahead of Ford, had brought Nash-Kelvinator up to a leading place, had reorganized Consolidated - Vultee for Avco, this challenge was no idle boast. Blees had even brought Crosley up from what he termed a third-rate company in the appliance industry to third place in 1950. And he was daring the rest of the industry to quit "milking" the demand market and be as aggressively sales promotional as Crosley is.

On the same program with Blees were two Spokane advertising men. They were Harvey Brassard, Devine & Brassard; and Randall Johnson of the Washington Water Power Co. advertising staff. Maage LaCounte, vice-president and general manager of Columbia Electric & Mfg. Co., as president of the Spokane chapter, ran the meeting. Both talks gave practical advice on a scale that was useful and usable by the dealers of that area.

### Ads for the Small Business

Brassard warned that advertising was no magic formula but is a tool of business; an investment, not an expense. He then ran through the why, how, what, when and where of advertising for a dealer's business.

*Why*—because business cannot grow without customers, new customers. Advertising won't sell bad products. It can advertise your weaknesses. But it can be used to hammer away at your chief advantages. But don't brag or skirt around the truth. Customers won't be kidded long.

*How*—Plan advertising as carefully as any other detail of the business.

*What*—Everything in the store. Ad funds are usually related to sales. Adjust the averages depending on the location, competition and type of store.

*When*—Not hit or miss, but all the time if you can. Save your shots for those seasons when certain lines sell better; peak your advertising and stock at the time of the best season. Promotions when you have something special to offer. On hard-to-move items, take your mark downs and have a clearance. Advertise any values your customers should hear about; any change in facilities, all news. Make a calendar of advertising before you begin your business year to match your seasonal curves of sales.

If specific items are advertised, display them prominently. Be sure your sales people know about your ads. Post them near the door, the cash register, near the goods advertised, in the windows with the goods. Tie in national ads with the products.

*Where*—Each medium has its own advantages, each does a different job. Newspapers are looked to by people for sales news, news of products and services. Radio is word-of-mouth, personal advertising. It is flexible to changes, quickly. Outdoor boards, seen by people on the go, are read on the run, so be brief—ten words. But the local advertiser looks as big as a big company because all boards are standard. Bus cards have high circulation value at low cost. Color can be used. Direct mail goes directly to selected people.

### Display—Your Low-Cost Salesman

Randall Johnson, in a homey talk, touched on the fundamentals of display, offering some short cuts that make it easier for dealers. The right way can be just as economical as the wrong:

Contrast is important, Display a clean shiny refrigerator against a dark blue background. That's better than against an old plaster wall.

Lead the eye to the gimmick with contrasts, pointers, etc.

Be careful not to build a lot of competition into a display by putting too many things in it. The dime store window is an example.

*(Continued on Page 81)*

ELECTRICAL WEST

Sales Guide

# News Letter

FOR THE ELECTRICAL MERCHANT OF THE WEST

January 1951

It's like shifting gears--the clutch has to be let out until gears are shifted before letting the clutch back in and giving it the throttle. America is shifting into war production gear. The normal acceleration is slowing down. It may take 'til March before the clutch is let in again and momentum picks up. Until then there's not much can be started in the merchandising field. The sensible merchant will open up shop each day to do the best possible job with it and with his merchandise. Like Scarlett O'Hara in "Gone With the Wind," think of tomorrow when it comes.

Gear shift

Despite inevitable shortages soon to come in TV sets the supply is such now that many dealers are torn between a decision to stock and store against that time or to unload too heavy inventories to get their money out. The after-Christmas drop-off has been deeper than usual. With white goods the supply is not so lush; selling is even needed.

Dilemma

Now it's official—Avco has bought Bendix Home Appliances and the latter becomes a division of Avco. Jud Sayre stays its general manager. Bendix division will be operated separately, keeping its present distributors, policies, identity.

In the wash

Now Zenith, always different, is to launch some 16 rpm records because its record players have a range of speeds from 10 to 85 rpm. The records will be "talking books" and a 12-in. will play for an hour. . . At long last Zenith's Phonevision test has started in Chicago, with 300 home sets equipped to receive it, a selection of first-run movies offered at a dollar per program. Pictures run at 4, 7 and 9 p.m.

Ouch!

Glen L. Logan, former executive assistant to the vp in charge of sales of Packard Motor Car Co., succeeds William J. "Bill" Quinn as managing director of the Electric League of Los Angeles, as Bill Quinn retires, it was announced by Willard Hellman, president of the league.

New leader

Mrs. Peter Wuebel of Redwood City won the Pillsbury national baking contest held Dec. 11 in the Waldorf Astoria, New York. Her prize is $25,000 and a complete General Electric kitchen.

Takes cake

Flying dryers came flying West for the Christmas market by Flying Tiger air line. Lou Stull, Western division manager, Apex

Dryers fly

Inland Empire Electrical Dealers Assn. is working up a packaged program of monthly promotions, with slogan, ads, banner, display material, shows which it will sell to the utilities, manufacturers and distributors to get them to invest in its support. The association will finance the initial effort to demonstrate its worth and convince its "customers" of the worth of the deal. It is a new approach worth watching. Stanley Danson, who operates four stores, is president of IEEDA. Robert Wilkinson is its dynamic manager.

Different approach

Two sound slide films on its Universal Select-A-Range and 1951 Speedliner electric ranges are ready for use. Landers, Frary & Clark has announced many of its 1951 models—five ranges besides the Select-A-Range, each with a variety of features; five round, two square and a table top model water heater; electric floor polisher, tank type and motor driven brush hand vacuum cleaners; two ironers; streamlined food mixer; newly designed Coffeematic; large-size Cook-A-Matic for toasting sandwiches, baking waffles or frying eggs, etc.; scroll pattern designed automatic toaster; single and two-speed washers.

Full range

An improved De-Frost automatic refrigerator defrosting unit has been brought out by Automatic Controls Corp. of Ann Arbor. Improvements are a skip-defrost adjustment and an adjustable defrost cycle from 1 to 10 hours. The skip setting is to keep ice cream or frozen food from melting, on occasion.

Deluxe defrosting

Electric Housewares industry is out to capture a much larger share of the year-around gift market business for its distributors and dealers. Electric Housewares Section of NEMA says a full-scale merchandising and promotion program with the theme, "Give Electric Housewares—First Choice for Every Gift Occasion," is being launched this month. Point-of-sale dealer merchandising program is available on request.

Push on electric housewares

Telechron has begun its 1951 sales drive with two new low-priced electric clocks, an alarm model and the Jubilee kitchen wall clock. Both have curved shatterproof crystals with easy dial reading.

Two timers

H. M. Switzer Mfg. Co. has taken on manufacture and distribution of the Geneva automatic electric clock refrigerator defroster.

Takes over

Two 17-in. TV table models and one console receiver have been added to Emerson's 1951 television line. All are equipped with the special Emerson TV performance features.

New ones

W. J. Morris Co., pioneer Spokane electric appliance firm, whose downtown store was lost in the Ridpath Hotel fire early in 1950, has bought the store lease of A-1 Sales Co. at W. 523 Sprague Ave., and will open a downtown outlet there. Morris will also continue his store at Ninth and Grand St. in the city.

Another store

Herbert H. Horn, southern California Admiral distributor, has been appointed to the wholesale advisory committee being set up to consider the impact of defense mobilization upon radio, television and household appliances. The committee, which was established under the Department of Commerce and National Production Authority, will meet periodically in Washington to consider matters of inventory, equitable distribution of critical materials and the supply and maintenance of home, shop and factory appliances and machinery in light of the defense program.

Federal appointment

**Finale of Crosley show's home freezer skit, when Murphy decides to live the life of Riley with a freezer instead of tin cans—S. F. Opera House showing**

Have one thing dominant. Then you can support it with a couple of other items.

Be careful not to get a lot of monotonous shapes in a window.

Pick out the best spots in the store for display and use them to sell the hard-to-sell stuff. Don't waste it on something that sells itself.

Look at your lighting. Punch down a lot of light on a piece of merchandise to attract attention to it.

Put in cards and price tags. In tests of windows with and without price tags or cards telling the price those with cards outsell those without. To be without a descriptive card or tag is like seeing a picture in a book without a caption to tell what it is all about. If you can get some tailor-made cards, fine, but if you can't, make some yourself.

Don't underestimate yourself as a copywriter for your window or display cards. Make appeals to the person. Get down to earth with human appeals.

Look your store over, clean it up a bit, make it look good. A bit of housekeeping pays dividends. If the old linoleum needs replacing, do it. Invest in a few properties for display. Investigate some of the animation gadgets to give action to your displays.

Blees and four members of his staff flew in barely in time for the meeting because of airline delays. He started his talk by saying, if a man wants to be a salesmanager, he has to be out in the field and that anyone who works for him has to travel. Thus they know what is going on. Right now, Blees said, he knew a darn sight more than Washington did.

His talk was centered on three points —"How do we feel about the war. How's business—elsewhere (you know what it is here), and some of the things we have done to make Crosley an important company."

Of the war he said it was the first responsibility of every man and every company to place himself at the disposal of the nation in the emergency. Yet there is a definite responsibility to support the 30% of the nation's productivity for war preparation by maintaining the 70% civilian production with sales. With restrictions and tax increases it will take energetic selling to dispose of the 70% production. He did not attribute the decline in sales in the past month entirely to credit restrictions. Other factors, such as a normally slower season in the fall, previous panic buying, credit controls, taking of ten million young men into armed forces and the financial uncertainty thus caused among them and their families, all had influenced the present market. And confusion would last until April, when the war production would actually get started. He advised keeping "your muscles hard by exercise in selling."

Blees then reviewed the story of his strategy in helping Chevrolet to top Ford in sales and other campaigns he had generaled, and the shock technique he had introduced to put Crosley up toward its goal of first place.

# And Crosley's Big Show

Crosley's been waging a "commercial battle" in the electrical appliance field ever since sales strategist Bill Blees joined the organization in 1948. As Crosley sales manager and Avco vice-president, Blees and his road show troupe have been touring the country since last September showing dealers the company's latest appliance ammunition with an $800,000 product presentation show. In each city Blees outlined Crosley's responsibilities and program in these unsettled times. Late in November the troupe hit San Francisco, then wound up its strenuous tour in Los Angeles.

Pledging the company to two responsibilities, Blees declared that Crosley would (1) Place at the government's disposal all its facilities, resources and organization that might be needed to defend the country; (2) help maintain the economy and prosperity of the nation during the period of conversion from commercial production.

"However, until the government calls on all our facilities, we intend to continue with consumer production at the highest rate possible, keep our people working and forge ahead with a program that is flexible, so it can be changed quickly if necessary," Blees said.

In its continuing "commercial war" Blees had only to point to the company's accomplishments in the past few years. Since 1948 Crosley's refrigerator sales have skyrocketed from tenth to third place nationally, television sets are up 70%, ranges and radio sets up 300%, freezers up 600%. Crosley's goal, as Blees candidly puts it, is to get Frigidaire's first place in appliance sales.

With a troupe of 60—executives, professional actors, choral group and orchestra—the elaborate show was presented to some 1,000 Crosley dealers, their wives and salesmen from northern California and Nevada at San Francisco's Opera House. A musical prologue set the scene for the whole program, with lively skits between acts and a group of New York beauties to introduce the 1951 Shelvador refrigerators, with pale green "soft-glow" interiors and automatic defrosting. Factory executives, with detailed presentations, unveiled each

product in the 1951 Crosley line.

Highlighting the Shelvador first, Crosley specialists went on to show the new electric range line with all the latest features, including clock control; its 1951 water heaters; new freezer line, eight models in all, featuring one model with the Shelvador in the lid for storing frozen food packages; soft-glow color on certain models; "all colors of the rainbow" snappy new radio line; television receivers with wide-angle vision, precision control and unituner; module TV sets with record cabinet, radio-phonograph combination and TV sets, which can be arranged in several combinations.

Concluding the impressive product showing, Crosley's huge advertising program was briefed by George Simons, national advertising manager, and R. K. White, assistant general sales manager. Following the afternoon show, dealers were guests of California Electric Supply Co., local distributor, at a cocktail party and banquet, plus a fast-moving vaudeville show put on by the Crosley entertainers, at the Fairmont Hotel.

## To Meet the Curbs

To take the scare out of credit restrictions by showing actual figures is being advised all dealers. When the breakdown is made the customer often finds that neither the down payment nor the regular payments are as forbidding as they had been imagining from the newspaper stories.

To guide dealers Frigidaire's Oakland branch has been sending bulletins that suggest many ways of attacking the problem. One is called, "Save the Down Payment" plan, with calendar banks presented to prospective purchasers in which to save the down payment. An initial deposit is made and the bank then used to fill out the down payment. In the bulletin the details of the payment, difference and amount per day required to bring the deposit up to the required 25% are enumerated.

Another idea suggested is to price-tag the appliances with the amount of the down payment, instead of the words "25% down" and also to add, "and as little as —c per day." It plainly shows the amount of the down payment. Many people cannot figure a percentage correctly. And it minimizes the balance payments. It allows the "monthly budget keeper" to see where she can include the payment money, perhaps by cutting down on some items. Another good suggestion made to hold customers who must wait for delivery of an appliance is to take them into a room where they can be shown a slide film and given the full product story as insurance of their willingness to wait for the appliance they prefer.

An interesting comparison of how the credit curbs affect down payments and monthly payments is made by a General Electric distributor in the table on this page (interest charges omitted).

# SERVICE PROGRAM IS READIED

Anticipating another swing from sales to service for dealers under a war-preparedness economy, Thor Corp. now has ready a program along service lines, M. R. Wilson, general sales manager, and C. E. Bulloch, assistant general sales manager, told ELECTRICAL WEST in an exclusive interview while in San Francisco, Dec. 13. All of Thor's authorized service and parts stations are being urged to carry large stocks of repair and replacement parts. Films on servicing, as well as films to show how to sell a public service that of servicing and reconditioning of all washers and ironers in use today, are available.

Wilson said that the dealers have responded to this sound idea and bought sizable stocks. They are in a better position today to render this service than at any time in Thor history, he added, and Thor is one of the first makers of home laundry equipment. The service program will be backed up with a newspaper advertising campaign to urge the public to have their machines put in first class condition.

The selective dealer program of Thor, said Wilson, is really proving itself. By limiting the number of dealer franchises each dealer is doing a better selling job, is happier, the factory is doing better and a new benefit has been found in it. It helps the company to allocate the available production more fairly.

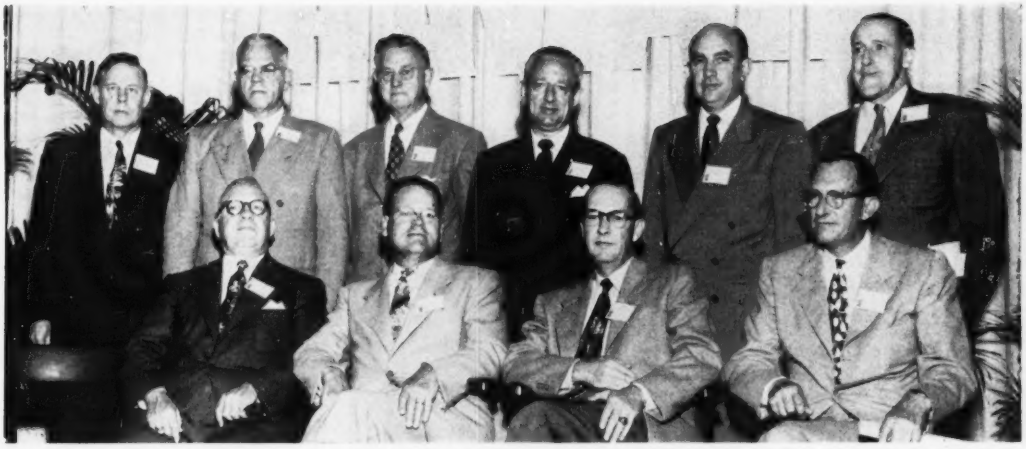
Production, Wilson said, will be off at least 25% next year. The industry's ingenuity will be successful in getting far more production out of available materials than was first thought possible.

Franchising of new dealers stopped over a month ago, Wilson said. The company now has 5,000 dealers nationally instead of 16,000 and yet the volume of business has increased so that Thor has done about 20% more than the industry average. The change also to a distributor organization instead of factory branch offices has proved beneficial and the company now has that group complete.

Distributors for Thor in the West are: Kierulff & Co., Los Angeles and Fresno; Lee Distributing Co., San Diego; W. J. Lancaster, San Francisco; Robert L. Rice Co., Portland; Seattle Hardware Co., Seattle; R. H. Gemberling, Spokane; Parker-Montana Co., Billings; W. H. Bintz Co., Salt Lake City; Appliance Distributors Inc., Denver; Fannin's, Phoenix, and Appliance Distributors Co., El Paso.

Wilson and Bulloch made the trip west in order to hold serious meetings of Thor district managers and division sales staff people in Los Angeles and San Francisco. As a parting word he declared, "Tell the trade that they will buy washing machines cheaper today than ever again in their lives." He explained that higher priced materials and engineering changes to put new or different materials to use will be reflected in higher prices.

| Item | Cost | Old Down Payment | New Down Payment | Old Monthly Payment | New Monthly Payment |
|---|---|---|---|---|---|
| TV-radio-phono-comb. | $ 439.00 | $ 65.85 | $109.75 | $20.73 | $ 21.95 |
| TV-console | 199.95 | 29.99 | 49.99 | 9.44 | 9.99 |
| 1950 Buick (Used) | 2,695.00 | 898.33 | 898.33 | 85.81 | 119.80 |
| 1949 Chevrolet (Used) | 1,495.00 | 498.33 | 498.33 | 47.46 | 66.44 |
| Washing Machine | 119.95 | 17.90 | 29.98 | 5.66 | 5.99 |
| Refrigerator | 249.95 | 37.49 | 62.48 | 11.80 | 12.43 |
| Bedroom Suite | 299.50 | 29.95 | 44.92 | 14.97 | 16.97 |



Members of the PCEA panel were (back row, left to right) H. P. Field, HECO, session chairman; W. A. Howe, Westinghouse; H. C. Rice, SoCalEd; George C. Tenney, Electrical West; R. D. Moody, Allis-Chalmers; Victor W. Hartley, PCEA; (front row) Harry F. Hartzell, Maydwell & Hartzell; Frank Tracy Sierra Pacific Power; Henry B. Sargent, Central Arizona Light & Power, and I. W. Borda, Okonite. The panel pointed up the benefits of industry organization

# Industry Attends First Hawaiian PCEA Meet

Positive assurance of greater electrical industry coordination, development and promotion in Hawaii came out of the first Island session of the Pacific Coast Electrical Assn. Nov. 30-Dec. 1 in Honolulu when 325 representatives of all branches of the industry heard local and mainland speakers review progress and point up opportunities.

L. A. Hicks, Hawaiian Electric Co. president and PCEA vice-president, keynoted the gathering when he said, "the greatest gain comes from a restoration of faith in each other and a better understanding of the other fellow's problems. Such a gathering gives us all a feeling that we are playing a part in building a finer life for ourselves and our neighbors and are working together as a team with other business leaders in the community to make this world a better place in which to live. We have an opportunity and a responsibility—an opportunity to organize and bring together all of the elements of the industry in the Islands and a responsibility to preserve and enhance the high ethical standards of the electric industry."

While points of view, attitudes and definitions of purpose may differ between various branches of the industry there is a common bond of public service and a mutual responsibility for cooperative effort George C. Tenney, editor of ELECTRICAL WEST, told the group. He likened the industry to a wheel, with the public as a common customer at the hub; the manufacturers, dealers, distributors, inspectors and other branches as the spokes; and the utility with its electric service as the rim. "Remove or damage one element," he said, "and the ability of the wheel to function is impaired and ultimately destroyed."

Because this was the initial PCEA all-industry gathering in the Islands, a portion of the program was devoted to pointing up the benefits of industry organization. A panel discussion with Frank A. Tracy, PCEA president, as moderator served this purpose. Here are some of the observations of participants:

"The PCEA has a 34-year record of successful industry service and accomplishment for people in every branch."—Tracy

Philip Spaulding, the chairman of the board, and T. A. Cooke, director, HECO, at the dedication of the Waiau plant

"The public will never recognize nor fully enjoy the benefits of electrical living unless we sell them. No segment of the industry can do the selling job alone."—H. C. Rice, sales manager, Southern California Edison Co.

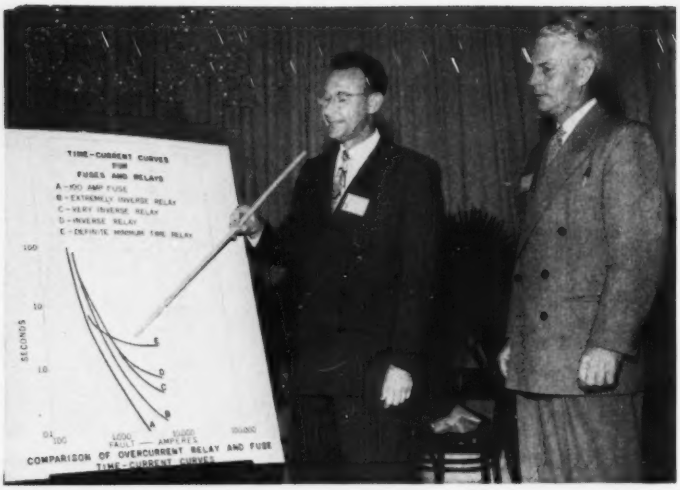
"One of our great opportunities for public service is in street and highway lighting. But it will require our best engineering brains and our full selling strength to carry through."—H. F. Hartzell, president, Maydwell & Hartzell.

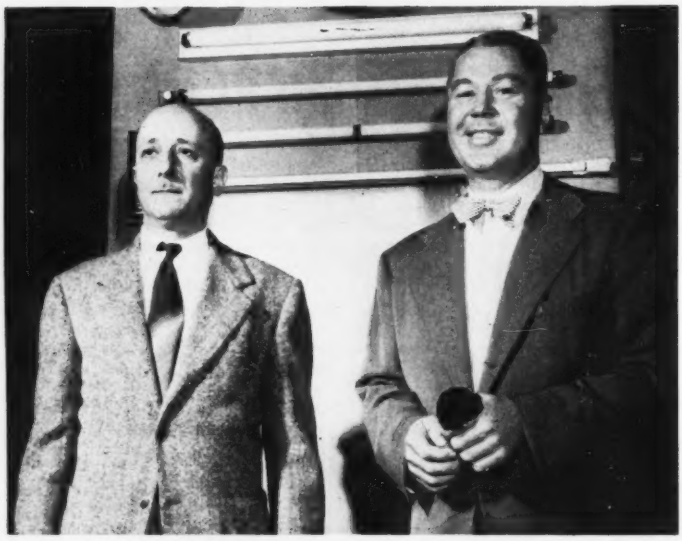
"Wiring is still the great bottleneck and defense mobilization shortages won't help us break it. Joint effort in telling the story to the public will."—I. W. Borda, PCEA past president and vice-president, Okonite Co.

"Human relations are probably our greatest problem. Coordinated personnel training on every level is essential to teach our people how to get along with each other."—Henry B. Sargent, president, Central Arizona Light & Power Co.

"Uniform codes and ordinances make the job of every branch of the industry easier. But it takes a neutral agency like the PCEA to sell them."—V. W. Hartley, PCEA managing director.

"Our individual technical and engineering problems are a lot less difficult when we can share the operating experiences and technical knowledge



of our neighbors through PCEA-sponsored discussion groups." — R. D. Moody, district manager, Allis-Chalmers Mfg. Co., Los Angeles.

"Because the whole industry has worked at it diligently for thirty years, farm electrification is farther advanced on the Pacific Coast than anywhere in the U.S. The job was well along before REA was even a dream in a politician's mind."—Tenney.

"Growth, diversity and complexity have intensified operating problems but not to such a degree that group action and group discussion can't solve them."—W. A. Howe, Pacific Coast engineering and service manager, Westinghouse Electric Corp.

Bigness in business isn't synonymous with badness, W. V. Merrihue, manager, employee and community relations, apparatus department, General Electric Co., told a luncheon meeting. He listed five tangible contributions of big business to national development: (1) It has the resources and facilities to transform pure research or experimental projects into flourishing new industries. (2) It develops small business. (3) It has perfected the miracle of mass production. (4) It armed America and the rest of the free world in the last war and can do so again. (5) In the field of humanities, it provides a good way of life for its people. In developing this latter point Merrihue described methods employed by his company in developing good bosses (published in full on p. 53 of this issue).

Our industry is just 18 in. away from a lot of sales, according to H. C. Rice, who spoke on the contributions of the dealer and contractor to better electrical living. "This 18 in. is the width of the dealer's counter—the short space that separates him from his customer—the customer who wants an appliance or a better wiring job. We all should look to reinforcing this most important point of sales contact. In the final analysis a well-informed salesman, representing a qualified dealer who in turn is supported by a wholesaler backed up by good manufacturers, must win over the customer and get the order."

Rice demonstrated his conception of the electrical industry with a gear-

**Hawaiian Conference personalities (top to bottom): W. J. Froome, system planning engineer, and L. W. Lengnick, design engineer, HECO. Robert Curley and Gersham Martin of Martin & Curley, consulting electrical engineers. S. L. Hawken, Garnett Young & Co., G. J. Crowdes, chief engineer, Simplex Wire & Cable Co.; Wilbur A. Howe, Westinghouse Electric Corp., and N. D. Kenney, area engineer, Simplex Wire & Cable Co.**

Conference speakers included (left to right) Carl F. Williams, HECO; John Jorgensen, Von Hamm-Young Co.; W. K. Watkins, Maui Electric Co.; Paul Johnson, W. A. Ramsay, Ltd., and W. V. Merrihue, General Electric Co.

driven machine in which each gear represented one branch of the business. He showed what happens when somebody throws a monkey-wrench—the machine blew up.

Henry Sargent decried industry complacency and smugness based upon good service and good operating records. An alert and informed personnel coupled with competent management—all imbued with the ideals of service and the will to do the job—are essential for survival today, he said. Constant work at the company and community levels coordinated with the industry's national programs is needed to build good public relations, he declared.

The second day of the conference was devoted to parallel sessions dealing with business development, operating economics and administrative services.

### Business Development

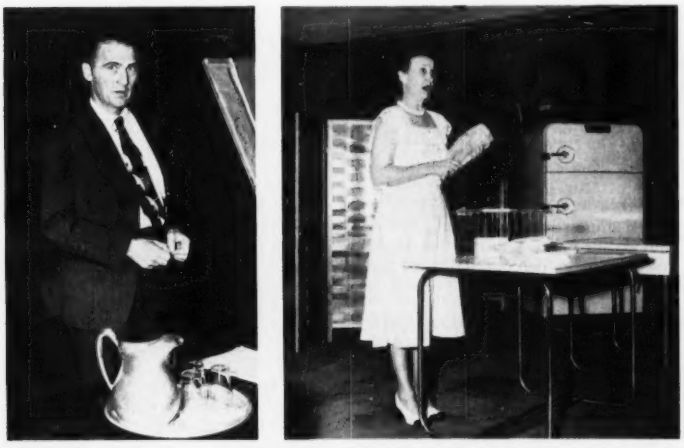
Home freezing, lighting, adequate wiring and cooperative appliance promotion featured the business development section meeting sponsored by Loys Griswold of W. A. Ramsey Ltd.

How preconceived notions that the home freezer would find no applications in Hawaii were reversed was described and demonstrated by Erma Meeks, director of Hawaiian Electric's home service department. She said that when freezers were first introduced her department reported that they were not suited to local habits or foods and then showed how five years' of use had changed this misconception. Assisted by Mew Lun Hee, Miss Meeks put on an outstanding freezer demonstration and sales presentation using Hawaiian foods.

In a panel discussion on "More Effective Lighting" Gersham Martin of Martin & Curley, consulting engineers, described two recent combined mercury vapor-incandescent installations where maintained intensities of 40 f-c have been obtained with maximum lighting for a minimum investment. Robert Curley of the same organization advocated mercury vapor units for Island street and highway lighting installations. He mentioned the possibility of a combined insect electracutor in such instances because termites, which are an Island pest, are attracted to blue light sources.

Benefits of the planned lighting program were brought out by H. L. Bargion, sales engineer, W. A. Ramsey Ltd. Today's light sources and fixture equipment offer everybody from the customer to the contractor an opportunity to profit, he declared. Three sales approaches are necessary, he said: (1) sell yourself on the benefits of good lighting; (2) sell the customer creatively; and (3) take full advantage of cooperative selling.

Home lighting in the Islands has been sold to such an extent that fixture allowances of $100 are common for small homes and $400 allowances are usual in the case of 3-bedroom houses designed by an architect, W. M. Armstrong, president, Hawaiian Lighting & Supply Co., told the group. He observed that attempts to provide good lighting in cases where decorators de-



R. M. McClaire, president, Oahu Electrical Contractors Assn., told about A/W in Islands; Erma Meeks, HECO home service director, demonstrated home freezing

mand both dark ceilings and dark walls are doomed to failure.

Specifications of the Adequate Wiring Bureau are applicable in Hawaii except for the provision of heater outlets, according to M. R. McClaire, president, Oahu Electrical Contractors' Assn. He stressed the value of adequate wiring as a door opener for appliance sales. That the long period of warranty and free service on electrical appliances might be used more effectively in selling was the conclusion of John M. Jorgenson, manager refrigeration and household appliances, Von Hamm-Young Co. He urged dealers to stop squeezing the last nickel of profit by offering excessive trade-in allowances and then reselling obsolete and broken down appliances.

#### Operating Economics

Coordination of fuses and circuit breakers, low-cost underground distribution and small-property operating problems featured the operating economics section session sponsored by L. W. Lengnick, principal engineer, Hawaiian Electric Co.

Problems of coordinating fuses with fuses and fuses with circuit breakers so as to provide maximum service continuity and minimum customer inconvenience were outlined by W. J. Froome, Hawaiian Electric system planning engineer. In any coordinating plan involving fuses with fuses or relays with relays he suggested that figures for maximum fault current be used. When relays are coordinated with fuses, minimum values of fault current should be used.

W. K. Watkins, manager, Maui Electric Co., described the difficulties of steam plant location occasioned by coordinating satisfactory fuel oil delivery facilities with a suitable water supply on that Island. Water was only obtained after expensive drilling.

Specifications and costs of two Honolulu low-cost underground distribution projects as described by C. H. Williams, principal electrical engineer, Hawaiian Electric Co., will be found on p. 56.

#### Administrative Services

That the importance of meter reading as a means of establishing and preserving good customer relations should never be underestimated was the conclusion of David M. Moncreif Jr., commercial department general supervisor, Hawaiian Electric Co., at the administrative services section. He said teaching meter readers something about canine psychology was important in a community where almost every household owned at least one dog. Problems of the meter reader are also difficult in areas where streets have no names and houses no numbers as in the less congested district on some Islands.

Collection problems are many in cases where service is furnished to itinerant workers in the large sugar and pineapple plantations, discussion brought out. On Kauai locked strong boxes have been placed in stores in which customers can deposit payments in specially provided envelopes.

How accounting practices can be set up to provide detailed transportation costs was demonstrated by William MacKenzie, treasurer Hilo Electric Co.

This session was sponsored by N. H. Callard, general manager, Hilo Electric Co.

Details of the conference were worked out by Harry P. Field, vice-president and commercial manager, Hawaiian Electric Co., while a luncheon, a banquet and a cocktail party sponsored by Westinghouse Electric Corp. were arranged by Charles E. Nolan, Hawaiian Electric vice-president and promotion manager.

## Airport Lighting

Airport lighting and the technique of ground controlled approaches were demonstrated in actual flight to 78 members at the monthly meeting of the Southern California Section of the IES in Los Angeles Dec. 6. Two half-hour flights of a Western Air Lines Convair loaded to 39-passenger capacity gave most of the 100 members attending the earlier dinner meeting an opportunity to view the elaborate lighting at Los Angeles International Terminal under almost perfect weather conditions. During a 25-minute flight around the metropolitan area, the plane passed over the field while runway lights were brought up to full intensity and lowered again to normal. Later, passengers listened over the public address system as the pilot was "talked down" by a ground operator of the GCA radar system.

C. W. Butler, chairman of the section's aviation lighting committee, arranged a varied program which included dinner in the Western Airlines hangar, two brief talks, the flights, movies, and a demonstration of fuel-burning fog dispersal equipment installed at the airport.

Fred Milam, chief of operations of Los Angeles Airways, described his company's helicopter service which puts mail from downtown Los Angeles on outgoing planes within 20 minutes. He predicted that with better lighting systems for landing guidance during poor visibility, shuttle service for passengers, mail, and cargo would become an actuality. He revealed plans for putting in operation when received next October, two ten-passenger helicopters to carry passengers from downtown to the airport.

Jack Egan, assistant superintendent of operations in charge of FIDO, described the installation at the International Terminal and demonstrated the high-pressure type burning nozzle used. Those attending also enjoyed a colored motion picture, *Integrated Landing Aids*, taken at the Landing Aids Experiment Station, Arcata. This Navy film showed the comparison of the many different types of systems tried at the station, and set out clearly the problems involved in providing guidance to the pilot during times of poor visibility.

## Coming Meetings 1951

**January**

IAEI, New Mexico Chapter, annual meeting, Hotel Hilton, Albuquerque ..... Jan. 11-13

**February**

Winter Market, Western Merchandise Mart, San Francisco..... Feb. 5-9

**March**

EMEA of So. Calif. Industrial Exposition, Shrine exposition hall, Los Angeles ..... March 15-17

IES Pacific Northwest regional conference, Hotel Davenport, Spokane ..... March 29-30

South Pacific region—canceled.

IAEI Joint meeting No. Calif., Central Calif. and Sacramento Valley chapters. Place not decided.

**April**

IAEI Annual meetings of Rocky Mountain, Utah, Idaho, Nevada and Montana chapters (Times and dates not yet set.)

RMEL Spring meeting Accounting, Engineering and Commercial Sections, Shirley-Savoy, Denver ..... April 15-18

NWPP Spring meeting, Wenatchee ..... April 12-14

NECA District 5, Westward Ho Hotel, Phoenix ..... April 23

NWEL&P Engineering & Operating Section, Salt Lake City....April 25-27

**May**

NWEL&P Business Development Section, Multnomah Hotel, Portland ..... May 7-9

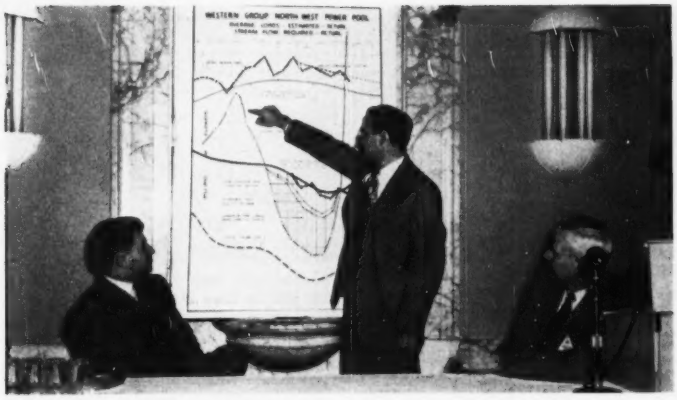
NAED Spring meeting, Lake Arrowhead ..... May 2-4

NECA District 8, Billings, Montana (Date not set)

NECA District 6, Sacramento (Date not set)

**June**

EEI National convention, Denver ..... June 4-7



Charles F. Monson, Puget Sound Power & Light, shows power pool behavior to contractors. Art Siegal, president, and Ralph Neilson, manager, on each side

# Contractors Launch Show

"The electrical industry is great today because the men in it have not stayed on specified routes between given points—they have not stayed on Highway 25 because they realized that there is a lot of country on either side of it."

This point was stressed by H. S. Schuler, Pacific Coast sales promotion manager for the Westinghouse Electric Corp., among the principal speakers at the fourth annual convention and exposition of the Electrical Contractors Society of Washington, held at the New Washington Hotel in Seattle on Saturday, Dec. 2.

Schuler discussed "One-Half Century of Looking Ahead," graphically detailing the tremendous strides taken by the industry during the past 50 years and optimistically predicting trends which indicate an "even better half century to come."

"Crossing the mid-century mark is something special," he said, adding that he was quoting from remarks made by G. A. Price, Westinghouse president. "We find that a review of five decades of major power and electrical apparatus is an excellent refresher course that adds immeasurably as we study the future. We need to be reminded of the doubts, uncertainties, hard work, flashes of genius, failures, and successes that surrounded every technical accomplishment now accepted without question as obvious."

As members of the electrical industry he admonished the association's delegates and members of the Northwestern Section, International Association of Electrical Inspectors, who were jointly meeting with the contractors, to "approach the last half of this great century with sleeves rolled up, eagerly ready to tackle our part in helping make this a better world. We are confident," he concluded, "that in the year 2,000, those who review the record of the 20th century will write, 'The last half was richer than the first.'"

Welcoming the delegates to Seattle and adding his best wishes for a successful convention, Robert H. Harlin, president of the Seattle City Council, spoke ominously of the immediate future of "our endangered country," then strenuously urged the continued development of the Columbia River, the city's Skagit Project and other hydroelectric sources in the Pacific Northwest. "The need of this further development," he said, "whether for war or for our industrial progress is obvious. It cannot be denied."

The hydroelectric development theme sounded by Councilman Harlin was reiterated by Charles F. Monson, assistant superintendent of the Puget Sound Power & Light Co., Seattle, who spoke on "the Northwest Power Pool and What It Means to the Electrical Industry." Monson's instructive remarks frequently referred to a large chart illustrating the points he stressed and calling attention to the various developments that go to make up the power pool.

Arthur Siegal, Sela Electric Co., Seattle, president of the society, in his presidential message, titled "Normal Times," questioned whether any recent times could be called normal. "Only one definite observation can be made—those who will fare best in the trying times to come will be the few who, as in times past, have seen and benefitted by the advantages of association with others." He then went on to say, "If we in Washington are ever to enjoy full prosperity in the electrical industry, we must also band together in a strong and active group that can effectively act with the other phases of the industry to meet and solve our problems before they arise, rather than enduring unfavorable conditions that are forced upon us or just happen because of our negligence." He declared that to be the goal of the society.

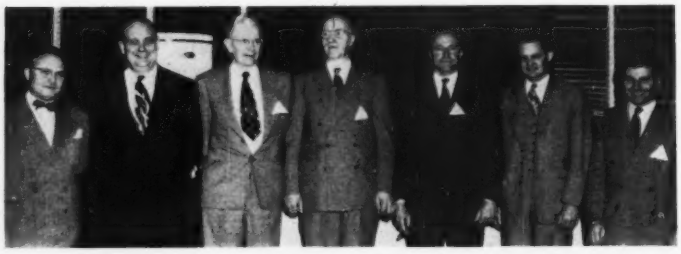
Manager T. Ralph Neilson had a similar thought. "No matter how big or how little," he told the contractors, "you are an important factor. You are important to the manufacturer because you keep him in business; you are important to the supplier who could not exist without you; you are important to the utilities because you fabricate the materials of the manufacturer into circuits, without which there would be no utilities. You are important to the inspectors because you are the branch of the industry in contact with the public, whose installations must be made in a safe and workmanlike manner. You are important to labor because there would be no labor, organized or not, if it were not for you, the employer." He invited all contractors to participate and make the annual electrical exposition stronger each year.

Seattle attorney, George Stuntz, counsel for the Electrical Heating Assn., stated that both private and publicly owned utilities, in his opinion, "would like to see electric heat gradually wither up and die; they would like to close their eyes and have it go away." He said that "effort has been employed in many directions to try and slow down the development of electric space heating because of the public acceptance that it has today, particularly in light of the higher cost and scarcity of ordinary fuels." He also stated that "some utilities have resorted to higher punitive rates: others have set up restrictions where they formally refuse to accept the service."

Stuntz intimated, however, that many householders are getting electric heat despite the apparent opposition of the utilities, "through bootleg channels or where they are heat-

ing their homes with their electric ranges, dime store portables or other makeshift devices."

Stuntz said that the power shortage is recognized and that the utilities' problems are appreciated, saying "the interests I represent are not advocating any extensive promotion at this time which would add seriously to the burden of the utilities. However, in fairness to the customers and to the electrical industry, we do feel that the efforts often employed to curtail this development are both discriminatory and unfair. "After all," he pointed out, "a kilowatt is a kilowatt regardless of the device in which it is used. Almost all of the power consumed within a home ultimately produces heat, whether it be lights, the kitchen range, radio, or even the refrigerator."



Schuler Kirsop Neilson Hooper Widrig Monson Siegal

According to Attorney Stuntz, a new home heated electrically can be built for much less than a home heated with a conventional-type heating system. He said that as much as $1,000 is saved in the over-all building cost, including the heating plant. "This," he said, "has an effect on housing—a particularly critical commodity. The electrical contractor enjoys a far greater cut of the builder's dollar. These same benefits to the electrical industry are carried on through to the supplier and ultimately to the manufacturer of heating equipment, panels, wiring material, transformers, and on down the line."

Speaking on the subject: "What Inspection Means to You and the Public," Chester M. Kirsop, first vice-president of the International Association of Electrical Inspectors, and chief electrical inspector of the city of Olympia, first outlined the history of the code governing the installation of wiring, then launched into an explanation telling what the code means to John Q. Public. "It means more to him than to the electrical contractor or the electrical inspector," he said. "Often John Q. Public does not realize this, but nevertheless the fact remains. It means more employment, better materials, advancement in knowledge of design and installation, cheaper prices for better materials and appliances, lower insurance rates, increased earning power, safety in the home, school, office or plant, protection of the loved ones, decreased cost of housing, less fires and accidents, cheaper cost of electric power, and a sense of comparative security that his electrical installations are right."

During the afternoon joint session with the electrical inspectors a panel of electrical inspectors participated in a quiz show, answering questions from the floor propounded by the electrical contractors. The inspector panel included W. A. Gaffney of Tacoma; John Watt, Seattle; John Hewitt, chief state electrical inspector, Chester M. Kirsop, Olympia, and Ray J. Larrabee of the Underwriters' Laboratories in Seattle.

Previously Larrabee in an address, "Who is our Enemy?" had outlined the growth and development of the Underwriters' Laboratories, explaining that our enemy was ourselves. Thomas M. Widrig of the Trumbull Electric Mfg. Co. had brought greetings from the Electric Club of Washington. Widrig, in a brief address, told of the founding of the Electric Club in 1920, explaining the work of the organization and its potential value to the industry. The membership of the club, he said, covers every branch of the industry and is held in high regard.

A highlight of the afternoon session of the convention was furnished by A. L. Wiegenstein, district sales manager of the Westinghouse Electric Supply Co. of Seattle, who, speaking for the suppliers, stated that "the value of the electrical distributor has grown to the extent that at the present time there are very few manufacturers of electrical equipment or supplies that do not market their products through distribution channels.

"In the old days," he said, "we were commonly known as jobbers, but events of the past 15 years have graduated us up from that class to the higher classification of distributors.

"We electrical distributors," Wiegenstein continued, "have certainly moved a long way from that function of the electrical industry, although, I am sorry to say, there are a few who still function as buying agents and do not give the full measure of responsibility and service to which you are entitled.

"A few years ago there was considerable talk in certain high places about eliminating the distributor. This line of thought was instigated primarily by people who really had no conception of the services performed by the distributor. The only thing they could see was that very small margin of profit that might be saved if products were brought to market direct from the manufacturer to the consumer, not realizing, of course, that this saving would be more than eaten up by added selling expense, expensive warehousing facilities, and the added manpower that would be necessary in bringing their product to market. The experience gained during the last war has proved conclusively that our military, as well as our economic requirements, have established the electrical distributor as a very important factor in our American way of life."

Norman L. Bost, Seattle manager of the National Electric Products Corp., discussing the subject "Where Are We Headed?" looked dubiously into the immediate future, suggesting that not only hindsight but foresight is greatly needed in the present emergency. He asserted, in his opinion, "that it is much later than we think and the going for some time to come may be exceedingly rough."

The convention, well attended and considered most worthwhile, concluded with a banquet in the Windsor room of the New Washington attended by approximately 225 contractors and men of the electrical industry, including electrical inspectors and their wives.

On Friday evening, Dec. 1, the society entertained inspectors, manufacturers, jobbers, manufacturers' agents and other industry men with a buffet luncheon and refreshments. The exhibits of 25 manufacturers and jobbers were previewed at this informal session.

Election of officers followed at a special meeting, Dec. 6. Arthur Siegal of Seattle was re-elected president; Don F. Willingham of Everett named vice-president—west and Melvin Rothrock of Tonasket, vice-president—east. T. Ralph Neilson, Seattle, was re-elected secretary-treasurer and manager. The board was not elected. Dues were revised and code and estimating classes discussed.

# Interdependence Stressed by Idaho Group

Interdependence between the various branches of the industry was the keynote of the 1950 annual meeting of the Idaho State Electrical Contractors Assn. at Boise, Nov. 17-18. It was spotlighted in the address of President A. R. Woolley, Mountain Electric Co., Pocatello, and echoed by every speaker on the program of the two-day meeting. Main purpose of the gathering and the reason for an earlier-than-usual call, was to get the final wording of a proposed revision of Idaho's state electrical law so that it was acceptable to all; would have unanimous support when submitted to the legislature in January. Practically an entire night was given to discussion of this law alone.

With humbleness rather than pride President Woolley said he reported little progress. Contractors are such rugged individualists and never admit anything wrong with themselves, he said, that it does not make for much collective action. They are prone rather to help each other down the ladder instead of up, even where they know their fellow contractors are wrongly accused. "If we could only realize that our competitor is not our competition; it is nation against nation, industry against industry.

"An understanding of our interdependence, our individual responsibility to our own contracting industry, our dependence and corresponding responsibility to the electrical dealers, and our dependence and responsibility to our utility friends, to our manufacturers and suppliers, would do much to clear the muddied waters. We are *inter*dependent, and an admission of this would help us materially.

"One thing I've noticed—that the bigger an electrical contractor gets the more he relies on his trade organizations. Why is this? Probably because he finds that as he gets bigger his problems also get bigger and his own individual efforts prove rather inadequate to cope with them. Consequently he turns to his organization for collective action.

"And stating things in reverse, the contractor who does not grow is the one who insists on remaining within his own shell, who will not join and support his industry organizations, and who maintains that rugged individualistic attitude of beligerance toward his fellow contractors, his utility and his dealers."

Distributor-Contractor interdependence was described by Lou G. Berger, district manager, Westinghouse Electric Supply Co., Los Angeles. After outlining the contractor functions—furnishing the customer equipment, organization, engineering, estimating, financing, procurement, business management, salesmanship, labor relations, etc.—and those of the distributor—carrying inventory, quality goods, distributing facilities, warehousing, catalog service, management, personnel, financing, local service, engineering advice and data,—Berger showed how both were really partners in service.

He summarized by defining a policy and making known that of his firm—to be able to support the electrical contractor by integrity of quotations, keeping confidences, being financially sound, guaranteeing product performance, supplying sales and technical support, obtaining deliveries from manufacturers, etc. With clear understanding of policies, contractor with distributor and vice-versa, confidence is established and maintained.

What National Electrical Contractors Assn. policy is and what it is doing for electrical contractors was presented with sincerity by Matt Sherwood, Western regional director, San Francisco. Repeating that the next ten years will be the best years the industry has seen because of the programs of power expansion under way, Sherwood said it could be a profitable business for contractors if they sell. Predicting that a great part of industrial mobilization would come to Idaho because of its interior location, he then went on to tell of the services and functions of NECA that can be used by a contractor to help him make his business sound and profitable.

That many people consider NECA devoted only to labor relations, he said, is a mistake for it has many other functions. One of the main ones is that of research and education, which covers labor units, overhead costs, job costs. To head this activity, a Westerner, E. R. Cornish, his predecessor, had just been called to Washington. He spoke of the estimating and job analysis classes Cornish had held, of the correspondence course which 525 electrical contractors were voluntarily taking.

Sherwood also described the public relations, the business promotion, the guaranteed wiring, the preventative maintenance programs of NECA. He told of the value of a labor relations clearing house and experience in negotiations. He described the publications and the accounting system of NECA, stressing the value of local chapters he told how important it was to have a full-time manager to represent contractors.

The place of the state department of labor and its functions was told by W. L. Robinson, commissioner of labor, Boise. In his talk he spoke of the department's responsibility for safety for workers and the handling of labor relations.

"One Half Century of Looking Ahead," was presented by H. S. Schuler, Pacific Coast sales promotion manager, Westinghouse Electric Corp., San Francisco. (His talk is reported in some detail in the account of the Electrical Contractors Society of Washington meeting on another page.) Schuler concluded by showing a new Westinghouse color film commemorating the 25th birthday of the company's research laboratory at East Pittsburgh.

Apprenticeship was the first subject on the evening program. Walter F. Wallick, secretary of the joint apprenticeship committee in Boise, made a concise summary of the need for training and how it is done. He began by saying that no one "picks up a skill or trade," he has to be taught. The program depends on obtaining young men with ability to learn, providing them an opportunity to work, and someone to teach them. The trade is not learned either in classroom or on the job, only by a combination of both and an opportunity to work at a full range of types of electrical installation. Details of how the procedure is set up were then given.

**Panel on state code—W. A. Hopper, Carl Rising, Joe Gilgan, Ferd Koch, Attorney Kenneth O'Leary, who read each section and answered all questions**

**Shotwell Brunell Keith Gilgan Bauchman Baldridge Brunzell J. Baldridge Woolley**

A rare feature, the presence of the state's attorney general himself, to advise and hear the discussion of the proposed revision of the electrical law, distinguished this meeting. The recently elected young official, Robert E. Smylie, first addressed the group, telling them how laws are made and amended and advising them to work prior to the meeting of legislature with their assemblymen and senators at home. Kenneth O'Leary, counsel for the association also sat in with a panel of those who had worked on the revision, answering questions and discussing the measure, paragraph by paragraph, until past midnight.

Saturday's session began with the showing of a moving picture on modern industrial power distribution made by General Electric Co. It was presented by John Bauer, division engineer, G-E Co., Salt Lake City. It compared the radial and the network systems for the handling of power distribution inside large industrial plants.

Idaho State Senator Marion Jensen, newly appointed administrative assistant to the new U. S. Senator from Idaho, spoke briefly on American foreign policy. Of contractor interest was his declaration that he had formerly opposed the Idaho state electrical law but had come to see its value and need.

Another of his simple, down-to-earth and very effective talks about the power supply situation in Idaho, the state's industrial future and the stake of all in maintaining private enterprise and private investment and faith in private business was given by T. E. Roach, president, Idaho Power Co. First he said that contractors and utility had problems in common and that their fortunes were inextricably bound together. With charts he showed how private enterprise had pushed power capacity growth in Idaho at a rate faster than Bonneville and that if permitted to do so would continue to develop the rivers for power in an integrated program that would preserve the mineral resources, save farm lands, and keep both control and power use in the region, instead of in Washington.

Some late indications of coming restrictions and controls were given by W. A. Cyr, associate editor, ELECTRICAL WEST, in a talk, "Is This Where We Came In, or Is It a Different Show." He then advised contractors to be more conscious of the impression they make on the public, their customers, and to try more to protect the interests of those customers.

T. Ralph Neilson, manager, Electrical Contractors Society of Washington, invited all to attend the forthcoming annual meeting and first exposition of that organization in Seattle, Dec. 2-3, and hoped for a Pacific Northwest annual conference and show like that of the Midwest Electrical Council, in which 16 organizations participate and six group conventions are held simultaneously. Julius Hooper, founder of the society was introduced too.

J. Carl Baldridge, state chief inspector, reviewed a year's experience in the enforcement of the present electrical law and told of the need for still more information to the public regarding it. The revised law would set up inspection fees which, with contractors and journeymen licenses, would provide enough funds to employ enough inspectors to bring the value of the inspection service to the public more generally.

Roy Crosby, Washington Water Power Co., Spokane, after telling of how the entire industry worked together to revise the Spokane electrical code, then told of a difference in meter installation standards his company had developed so that any Idaho contractors working in the area served by WWP would be informed.

Although not programmed, J. F. McAllister, Utah Power & Light Co., Salt Lake City, was asked to speak. He assured the group of the cooperation of his company. Its purpose, he repeated, was to make the field of opportunity greater for all.

In an interesting look backward over the history of the National Electrical Code and of the steps that led to the founding of the International Association of Electrical Inspectors, Ray J. Larrabee, service engineer, Underwriters' Laboratories Inc., Seattle, spoke on industry unity. The only enemy of the industry was internal dissention, he warned. By working together all problems could be handled.

Concluding the conference was a short business meeting at which the following were elected officers for 1951: President, Joe Gilgan, American Electric Co., Caldwell; vice-president, Joe Brunzell, Moscow; treasurer, Lysle Keith, Boise; secretary, J. Carl Baldridge, Boise; district vice-presidents, northern district, John Nannigan, Lewiston; southwestern, John Baldridge, Payette; south central, Harry Crippen, Gooding; eastern, Bob Bauchman, Idaho Falls; directors, A. R. Woolley, Pocatello; M. E. Shotwell, Twin Falls; Lewis Brunson, Rexberg; Al Barrett, Couer d'Alene.

Under the leadership and initiative of Mrs. Joe Gilgan a meeting of the wives of members was held and they organized an auxiliary association. Mrs. Gilgan was unanimously voted its first president. The women will have a program of their own at each gathering in the future. They had a style show for entertainment in Boise and participated in the closing banquet of the Idaho State Electrical Contractors Assn.

# Quick Catch-up

### EMEA

Electrical Maintenance Engineers Association of Southern California announces that its fifth annual Industrial Electrical Show has been scheduled for March 15-17 at the Shrine Convention Hall in Los Angeles. The show is sponsored each year by EMEA as a service to buyers and sellers of electrical and allied industrial equipment. George Larsen, Larsen-Hogue Electric Co., Los Angeles, is director of the 1951 show.

### IAEL

R. B. Hubbard, secretary-manager of Rocky Mountain Electrical League, Denver, was elected treasurer of the International Association of Electrical Leagues at its recent 15th annual conference in Boston. V. W. Hartley, managing director of Pacific Coast Electrical Assn., was elected to the board of governors of IAEL.

### Electric Clubs

Aims and objectives of the Electrical Service League of British Columbia were outlined by S. Earl Jarvis, district representative of the league for southern Vancouver Island, at a recent meeting of the Victoria Electric Club. Jarvis also presented a motion picture for members of the club, outlining methods of flood-lighting for municipal sports events and municipal playgrounds.

Arthur H. Howard heads the Electric Club of Los Angeles this season, with John L. Tindale, first vice-president; Ivan Bateman, second vice-president; Douglas G. Kendall, third vice-president; Carlisle Bailey, secretary-treasurer; Louis R. Grime, sergeant-at-arms.

### Power Dispatchers

Southwest area group of the American Power Dispatchers Assn. held a quarterly meeting in San Diego recently. Joseph Sinnott, protection engineer for San Diego Gas & Electric Co., as principal speaker, discussed relays and the part they play in the protection of the electrical system. The San Diego dispatchers hosted the group and earlier in the day conducted a tour through the Silver Gate plant where the new 50,000-kw. turbo-generator is in service. Los Angeles Department of Water & Power dispatchers will be hosts at the next meeting, scheduled for January in Los Angeles.

**Ray L. Halverson, new manager of Intermountain Electrical Assn., Salt Lake**

### Contractors

A new arrangement in contractors' conventions was featured at the Fourth Annual Convention and Exposition of the Electrical Contractors Society of Washington, Dec. 1-3, at the New Washington Hotel, Seattle, according to Ralph Neilson, secretary-manager.

Manufacturers and wholesalers showed their wares. The Puget Sound Chapter of IAEI also participated, holding its business meeting that morning in another location and coming to the contractors' meeting at 1:30 p.m. to put on a question period, Dec. 2. Dec. 1 was the manufacturers' representative day, with a dutch lunch, roving musicians and exhibit of products. Sunday was given to closed meetings of the contractors themselves. Ladies were entertained at a luncheon on Friday.

### EEI

Edison Electric Institute has reminded electric power companies of the seven prize award contests offered through EEI. In the commercial field deadlines for entries are: Thomas W. Martin Rural Electrification Award, Feb. 15; Laura McCall Awards, Feb. 1; George A. Hughes Awards, Feb. 1; Planned Lighting Awards, Feb. 15; Frank E. Watts Awards, Feb. 15. The Claude L. Matthews Valor Awards are due on March 1, and Reddy Kilowatt Annual Report Award on May 15.

### IAEI

A special Christmas meeting of the Utah Chapter was addressed by A. E. Fleming, chapter secretary and manager of the supply sales division of General Electric Supply Corp., who gave the group the low-down on the "Materials Outlook for 1951." The subject and speaker brought out a record crowd.

Northern California Chapter, met at Palo Alto, Dec. 9, asked that the utility committee working on the standardization of service equipment take the inspectors into their consideration and hear their point of view before proceeding any farther. A letter is to be sent to the committee asking for representation. Other topics were the grounding receptacle at the washing machine location and a question as to why manufacturers of washers are not supplying machines with plugs and cords to comply with this code rule. Plans to coordinate with the Sacramento Valley and Central California chapters in a joint meeting in March are also being made.

Southern California Chapter has already elected its 1951 officers. They are Robert Finfrock, Santa Ana electrical inspector, chairman; L. E. LaFehr, Alhambra electrical inspector, vice-chairman; and E. V. Muller, Department of Industrial Safety, secretary-treasurer. This was done at the last meeting, at which most of the session was devoted to questions and answers on code questions. The committee on uniform requirements for low-voltage relay wiring reported but new points brought up postponed any decision until the committee studies these. Arthur Veit, chairman of the committee, asked more members to participate and three new members were added to the committee.

Central California Chapter's last meeting heard a talk by H. G. Ufer. Underwriters' Laboratories, in which he explained the work of the laboratories and then discussed the question referred to it about approval of multi-breaker assemblies in which breakers of higher ratings could be substituted for those with which a panel was originally equipped. So far no report has been received.

At a previous meeting, Utah Chapter, the question as to whether to bring up the matter of a state electrical code to the new legislature was talked about but it was felt not enough ground work had been done to insure its passage. W. C. Brown, electrical engineer, Ashton, Evans and Brazier, Architects, described the electrical system designed for the new Veterans Administration Hospital under construction.

ELECTRICAL WEST

## 1951—Will We Be Ready?

WHATEVER 1951 may bring in the way of new or added responsibilities or sacrifices or all-out mobilization, the electrical industry here in the Far West will be ready. Electric power is the force behind the prodigious and productive industrial machine that must produce the armament to make America superior to the Communist agressors. To see that this supply is ready whenever and wherever it is needed is the responsibility of the utilities. Manufacturers and distributors must furnish the equipment and supplies to do the job. Contractors must install and maintain them. When the tight pinch comes, dealers may have to look elsewhere for temporary livlihood. Of this we may be sure: No sacrifice, no effort, no responsibility is too great. This time America must win.

## Unsound and Unfair Policy

REACTIONS to President Truman's Water Resources Policy Commission recommendations here in the West are almost universally unfavorable. Criticism falls into two categories. (1) The report is bureaucratic in character, ill-timed and completely at variance with public sentiment. (2) The policy could have been written in Washington without one word of public testimony or one mile of travel by the commission. In almost every respect the report is a restatement of the water and power dictums of federal public power enthusiasts who have been advocating these policies for years.

One specific recommendation is especially obnoxious to Westerners. It says that "full development of the nation's underdeveloped water power resources . . . should be considered a major federal responsibility . . . " Under this recommendation utilities that have made major contributions to the nation's hydroelectric development would forever be excluded from future hydro projects. Such utilities as Washington Water Power, Utah Power & Light, Seattle City Light, Idaho Power, Pacific Gas & Electric, Los Angeles Department of Water & Power and Southern California Edison would all be proscribed from further hydroelectric development. A federal agency such as the USBR would get a monopoly of future water power development. This is both abhorrent and against the public interest.

Throughout the report and in every policy proposal the expansion of federal power development gets the green light. Continuation of the program of constructing federal transmission lines is recommended. Building of steam electric plants to assure complete federal commercial power operation is condoned. Preferential treatment for public power bodies and co-ops gets commission blessing. The Valley Authority philosophy is extolled.

In ignoring the suggestions and recommendations of the representatives of countless local public agencies and business organizations, the commission virtually admits its bias and preconceptions. In this respect the proposed program is unfair and the commission has done the country a great disservice. Congress must be shown the divergence between the commission proposals and the wishes of the people lest the policy become statute as the commission recommends.

## Under the Axe

THE condemnation axe is a weapon of destruction says a recent advertisement of Puget Sound Power & Light Co. There is no denying this statement when it is applied to an integrated utility system. Puget is faced with nine condemnation suits involving half of its customers and all of its generating plants. In its most recent advertisement it says:

"Such piecemeal dismemberment of a large integrated electric system is a destructive, expensive, long-drawn-out process which results in a paralysis of operations in the meantime, with subsequent deterioration of service and a disruption of the economy of the area . . . What is proposed is a return to the 'horse and buggy' days of small, isolated, uneconomical, inefficient operations with consequent higher rates and poorer service. Such a piecemeal chopping up of Puget's system is fantastic and tragic under present conditions when the national defense program and higher

# EDITORIAL VIEWS

labor and material costs demand more, not less, integration of electric facilities."

This is sound logic, well put. However, the telling of it may be a trifle late. Such forthright and convincing argument put to the people years back might have precluded the fate that Puget apparently faces. It is a reminder that it is never too early to go to the public with your story.

## Say a Good Word Instead

RATHER than toss back and forth blame for poor relations between branches of the industry, A. R. Woolley, president of the Idaho State Electrical Contractors Assn., asked two pertinent questions in a recent constructive address:

"Let me direct to the utilities this question," he said. "When you have one of your customers, who is also one of our customers, come to you with accusations of us, telling you of our highway robbery prices, our indifferent or insulting labor, our discourteous treatment, our procrastination, our misrepresentation, and so on—when you come in contact with these customers of ours as you do repeatedly and almost daily, what do you say or do?

"Let me direct the same question to ourselves as contractors. When someone tells us of the monopolistic power company policies, their exorbitant rates, their fast and cheating meters, their customer-be-damned attitude—when this happens to us as it does repeatedly and almost daily, what do we say or do?

"And what is more important, if these contacts with our mutual customers are made not with the executive personnel in each case, what do our employees say or do?

"I'll leave the answers to these questions to each of you. Having answered them in your own mind, you will know where to place any blame. Squarely on your own individual shoulders, it belongs, all of us, contractor, dealer and utility men alike.

"All are members of one industry, all dealing with the retail public, exactly the same customers, and all doing what they can to discredit the other segments of that industry. Our industry has had to be good! It has had to have something that the public wanted and needed badly to survive that kind of internal destruction. I wonder that the public can have any faith at all in any of us. My omission of the distributor and manufacturer in this illustration does not mean that they are exempt in any sense."

How much better it would be to try to understand each other and interpret and explain each other to the one whose good will all of us need—the customer. It is for the customer, not ourselves, that *all* business exists.

## You Can Say That Again

*FAILURE to understand what makes our economy work serves to undermine private ownership and personal freedom. The wage earner who disregards the property rights of those who provide his tools, and demands all of the product as his "rightful share," is like blind Samson. His freedom will die in the ruins of the Temple whose pillars he has pulled down. The public official who fails to realize that government cannot spend anything except a share of the margin between the production and the consumption of its people, is a man to be feared as an enemy of liberty. The citizen who calls on government to supply him with security from the cradle to the grave, thereby encouraging government spending, is a danger to himself and his fellow citizens. If his pleas are successful, he can lose his freedom and gain no security in exchange. Men of greed and arrogance, who exercise their individual power as businessmen, labor leaders, or politicians to create dissension, ill feeling and dissatisfaction within our system of private ownership and personal initiative and competition, are men to fear and abhor. They can both destroy our freedom and take control of our lives.*
—Francis Adams Truslow, president, New York Curb Exchange.

# THE MONTH IN BRIEF

### Suit Would Ban WWP Stock Sale to PUD

A taxpayers suit filed last month at Wenatchee, Wash., against Chelan County PUD and Washington Water Power Co. seeks to prevent the company from transferring or the PUD from acquiring WWP stock. An injunction probably would force outstanding 2,541,800 shares of stock into public offering to comply with the SEC divestment order; probably would stop rumored sale for $55 million of common stock valued at $25 million by American Power & Light Co. to a group of PUDs represented by Guy C. Myers. Right of PUDs to acquire properties outside their districts granted in a 1949 law is being challenged in the state supreme court. Chelan PUD has pending condemnation suits against Pacific Power & Light Co.'s Ariel Dam; Puget Sound Power & Light's Rock Island Dam and WWP's Chelan Falls generating plant. Spokane city council is said to be watching proceedings closely with a view to bidding for the company's distribution facilities in the city.

### Rock Island Expansion Planned

Agreement between Puget Sound Power & Light and Chelan PUD on basic terms of a plan to expand the Rock Island hydro plant were reported late last month. It is proposed that the company shall make available under a long-term lease such of its structures and facilities at Rock Island as are necessary to enable the PUD to finance and install 120,000 kw. of additional generating capacity. According to Puget Power President Frank McLaughlin, this unusual arrangement is necessary because (1) the PUD has a pending condemnation suit against the plant and related transmission lines; (2) there is urgent need for additional generating facilities in the area; (3) because of variations in stream flow and other factors it is necessary that Rock Island and other company plants west of the Cascades complement each other to make possible maximum production of prime power from the interconnected system. It is estimated that the expansion of Rock Island will cost in excess of $26,000,000. It is to be financed by the district through revenue bonds. Present indications are that the work will take about three years. To expedite it, Stone and Webster, which designed and built the present plant, has been authorized to proceed with preliminary engineering plans, cost estimates and other essential data.

### New Rate Aimed at Electric Heating

A rate adjustment for 8,000 Tacoma City Light customers that went into effect Jan. 1 is aimed at electric heating, will not alter the utility's standing for lowest electric rates in the nation, according to C. A. Erdahl, public utilities commissioner. The new rates call for a minimum monthly bill of not less than 65% of the highest light bill during the winter months, and most of City Light's 50,000 users fall within this category already. The structure is aimed at leveling off power use for those who have an exceptionally high winter bill and a correspondingly low summer bill, through use of electric heaters. The new rate schedule also raises the minimum monthly bill from 50c to $1. First major change since 1939, the rate structure is not a revenue measure, according to Erdahl, but is designed for customers using electrical devices for heating, an installation that has been discouraged by the utility for several years. If it is found to work an unreasonable hardship on individual customers, sufficient time will be allowed for them to meet their needs for heat by other means, he said.

### California Oregon Power Asks New Rate

California Oregon Power Co. has applied to Oregon and California PUC bodies for electric rate increases sufficient to enable it to meet existing high operating costs and raise the new capital required for its construction program under way since the end of World War II. With more than $30,000,000 spent during the period from Dec. 31, 1945, through Oct. 31, 1950, this program will require an estimated additional $33,000,000 between Nov. 1, 1950 and Dec. 31, 1953, according to A. S. Cummins, president, who said that the company is squeezed between rates based on prewar conditions and the need for supplying an ever increasing amount of service at present-day inflated costs.

### Water Resources Policy Commission Reports

Comprehensive multipurpose federal water developments covering whole river basins were urged in the report of President Truman's Water Resources Policy Commission, published Dec. 18. The seven-man commission's 445-page first volume of a three-volume report called for broader, more complete federal water programs. Backing federal power growth, the commission proposed virtual ban on private power projects. No licenses that interfere with the full accomplishment of comprehensive multiple-purpose development of river basins, including marketing of the power incident to such programs in accordance with the purpose of Congress, should be permitted, it was suggested. Private licenses, the commission explained, would not be issued unless approved by the responsible river basin commission. Specifically mentioned in this connection were applications for FPC licenses by PG and E for the Kings River and Virginia Electric & Power Co.

### Winter Peak Falls Off

Because of unseasonably mild weather Pacific Gas and Electric's winter peak failed by 83,000 kw. of meeting the all-time system peak which occurred last August. The system peak on Dec. 21, the maximum for the winter, was 2,436,100 kw. The summer peak was 2,519,000 kw. Had a cold spell coincided with the maximum loads occasioned by Christmas, the summer peak would have been topped.

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# THIS MONTH'S NEWS

## Steam Generation Suggested In Engineer's Report

Steam-electric generation, probably using fuel oil, should be considered to supplement the electric-energy requirements of the Pacific Northwest during periods of adverse water conditions, Holland H. Houston, engineer for the Washington State Public Service Commission, recommends in a report to the commission and the State Department of Conservation and Development.

Such plants presently cannot compete with hydroelectric power and would require a subsidy, the report finds. By 1965, however, "it will become reasonable to project base-load fuel-burning plants as part of the power program," Houston believes.

Houston estimates steam-generated power will cost about 6 mills a kwh., including transmission expense and a 2% property tax. Hydroelectric projects now operating or authorized operate well below this figure but cost of power from federal projects not yet authorized but listed by Army Engineers for future development would approach this figure, Houston believes.

Power from Grand Coulee and Bonneville is now being sold for about 2 mills a kwh. by the Bonneville Power Administration but the rate for power from these and other projects now under development may be increased to 2½ or 3 mills in 1954, it was pointed out.

Fuel oil, at present prices, is far more economical than coal, the report finds, but Houston suggests that boiler settings of any steam-electric plant be designed so that oil, natural gas or powdered coal could be used.

● GRAYS HARBOR PUD of Aberdeen, Wash., has refinanced $2,871,000 worth of revenue bonds at lower rates of interest with John Nuveen & Co., Blythe & Co., Eastabrook & Co., B. J. Van Ingen & Co. and Harold H. Huston Co. Two series of bonds are involved, the 1945 series and the 1948 series, the latter being used by the district for the purchase of Puget Power & Light Co. facilities. The rates are understood to be 1.75% on bonds maturing from 1952 to 1958, and to be 2% for those maturing from 1959 to 1963.

# America's Road to Victory

## . . . Let's Increase Production

This is the time to speak out—now—at the beginning.

*Our industrial program for re-armament is getting off on the wrong foot.*

The talking and writing about it emphasize the wrong things.

Its headline words are "cuts" and "controls."

Those words make bad propaganda for the cold war.

"Cuts" and "controls" are no words to challenge the imagination and energy of our own people. They won't impress the masters of the Kremlin. And they can only make it appear to the rest of the world that America thinks it can defend the free way of life by abandoning it.

America stands as the world's champion against aggression because America has become the most powerful free nation in the world.

How did we get that way?

Not by putting ceilings on wages; not by rationing or clamping iron-clad government controls all over business and industry.

To be sure, some temporary controls are necessary to channel very scarce materials speedily to use for defense. So, too, are special taxes and credit restrictions needed to combat inflation. But they will be fatal if they blind us to this fact:

*We became the strongest nation in the world by out-producing every other nation.*

### Production—The Final Answer

Next year our government is planning at least a $40 billion military program. Instead of planning only on controls to divert $40 billion of production from the making of civilian goods to the making of military supplies, we should be figuring out also ways to push up total production.

Of course, our industrial plant is running at close to "capacity" now. And our labor force has reached almost full employment. There isn't much slack to be taken up.

Can even the United States add a $40 billion miracle of production on top of what it is already doing?

Our answer is "Yes"—and within two years. It can be done by adding about $6 billion each year to our program of capital investment which now runs about $22 billion a year.

Part of this added production will come from expanding our industries. The steel companies, for example, already have plans to increase their capacity almost ten per cent in the next two years.

*But by far the largest part of that $40 billion of added production must come from higher productivity—raising industry's efficiency.*

*continued on next page*

To meet our goals we need to raise our productivity five per cent a year.

Can it be done?

The answer is an emphatic "Yes."

## Raise Industry's Productivity

McGraw-Hill's studies of industry's equipment show that there are countless opportunities for improving efficiency. Our manufacturing industries alone need at least $35 billion of new equipment to raise their facilities to first class technical standards.

Here are some of the broad possibilities reported by the trained editors of McGraw-Hill's business magazines:

In many manufacturing plants as much as 40 per cent of workers' time goes into moving materials and parts—shifting things about within the plant between processes and to and from shipping platforms.

*FACTORY estimates that improved materials handling equipment and methods might well cut handling costs twenty-five per cent and save annually over 650,000 man-years of unnecessary labor.*

Modern machine tools designed since World War II are 40 per cent more productive, on the average, than is old equipment. But AMERICAN MACHINIST surveys show that 95 per cent of industry's machine tools are of designs at least ten years old. Replacing them could raise productivity of the metalworking industries at least ten per cent—enough to absorb a major share of the metalworking industries' part of the defense program as now planned.

In coal mining, latest equipment and methods can raise productivity sharply. The editors of COAL AGE estimate that production of bituminous coal could be raised from seven tons per man-shift to ten within three to five years.

Many new textile production techniques are 50 per cent to 75 per cent more efficient than those in use now. If plants could be fully modernized, and full use made of latest management methods, TEXTILE WORLD estimates that output-per-manhour would rise 20 per cent. *A FOOD INDUSTRIES study indicates that modern equipment plus the best management techniques could raise productivity in food processing at least 20 per cent.*

These are just some of the opportunities that industry can seize and by which the nation can profit.

## A Nation-Wide Effort

Of course, industry itself can't do the whole job. Labor, government and all the rest of us must cooperate.

Government's part is to see that its emergency controls are so applied that they will increase productivity and thus make possible an early lifting of such controls.

Labor's part is to help in the development of labor-saving methods and machinery and to welcome their adoption as the only sure way of continuing to advance the American standard of living while maintaining the American free way of life.

*For all of us the job is to work constantly for an expanding, ever-stronger America with constantly growing productivity; not a pinched and shackled America cooped up under wage and price ceilings and tied to a ration card.*

## Challenge to Industry

Here is a sharp challenge to industry to study the best work-methods that are being reported—to use every minute and every dollar it can to replace obsolete equipment.

Here is a sharp challenge to government to do everything within its power to make its control policies and its fiscal policies strengthen the incentives to industrial modernization—to demand sacrifice for a purpose and not for effect.

The job to which such opportunities point will take time—though nothing holds back adoption of some of the simpler improvements in work-methods reported in business magazines all the time.

But increasing production is our one best hope that we may be spared the full array of price, wage and production controls now and be freed eventually from all controls.

General Omar Bradley has said that the protection of our national independence calls for "long-range commitments that we are willing to carry out."

*A long-range commitment to fight this battle for peace with America's most powerful weapon—industrial productivity—is the surest guarantee of victory for the free world.*

Let's make that commitment—now—at the beginning.

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## POWER NEEDS OF LOWER COLORADO BASIN TOLD

Power requirements of the lower Colorado River basin—Arizona, southern California and southern Nevada—will be two and a half times as great in 1970 as they were in 1948, according to the finding of a new Federal Power Commission power market survey for the region.

Loads of electric utilities in the area will be 38-39 billion kwh. in 1970, compared with 15 billion kwh. in 1948. The report concludes that this will mean more fuel-electric capacity as well as water power in the region which now has more than half of its capacity in hydroelectric installations.

Peak demand in 1948 was more than 2.8 million kw. compared with an expected demand in 1970 of 7.5 million kw. Installed generating capacity in 1948 was 3.25 million kw., of which 1.87 million kw., or 59%, was in hydro. In addition to presently planned capacity expansion, another 5 million kw. will be needed by 1970, it is estimated.

With perhaps three million more kw. that can be developed on the Colorado River in the region, the report notes that fuel-electric capacity will "have to supply a large amount of the new generating capacity which must be installed."

Biggest jump in energy requirements is forecast for residential use. Because of population growth and increasing average power use, residential demand is expected to soar from 2,368 million kwh. in 1948 to 10,416 million kwh. in 1970, a 340% gain. Average annual use per customer will rise from 1,486 kwh. to 3,850 kwh. during this period.

Other major energy requirement estimates for the region in 1970 compared with 1948: industrial, 5,140 million kwh. (1948) to 11,141 million kwh. (1970); commercial, 2,039 million kwh. to 5,284 million kwh., and rural, 191 million kwh. to 453 million kwh. Pumping for irrigation which required 1,592 million kwh. in 1948 is expected to have declined 7% to 1,485 million kwh. in 1970.

● Pacific Gas and Electric Co. will build a new substation north of Cortina, Calif., at a cost of $1,350,000. The substation will receive part of the power now being transmitted from Shasta sub to Vaca-Dixon and will step it down to 110 kv. A $1,550,000, 110-kv. double-circuit transmission line 62 miles long will carry this power westward to Mendocino County and the Redwood Empire.


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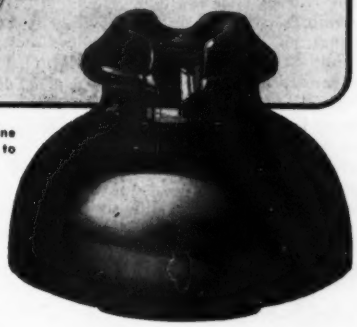

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## PUBLIC SERVICE OF COLORADO COMPLETES 57-MILE LINE

Public Service Company of Colorado marked another phase of its all-over development program by completion of a new 115,000-volt transmission line from its Leadville substation to Poncha Springs, a distance of 57 miles.

The project tripled the San Luis Valley's access to dependable power by connecting this new source of electrical current to existing 40,000-volt lines supplied by the Alamosa, Colo., plant. The Alamosa plant, John E. Loiseau, P.S. of Colorado president, pointed out, has been operating at full 12,500-kw. capacity for many months, showing an increase of 160% of power output in the past year.

Even more important: The Leadville-Salida job interconnects 15 of the company's generating plants; it will supply much-needed current to service the San Luis Valley's enormous summer irrigating demand and permit rerouting to other points in the central system as agricultural requirements lessen during fall and winter.

Cost of the spectacular transmission line, through precipitous mountain terrain, is estimated at $1,000,000 and brings to $58,500,000 the amount Public Service company has invested in construction since V-J day.

Loiseau further announced plans to install another 5,000-kw. generator at the Alamosa plant by 1953, increasing present potential 50%; its capacity has been stepped up 900% since Public Service began operation in 1924.

## PUD Hydro Project Called Impractical

Snohomish County PUD of Everett, Wash., has been informed by R. W. Beck, consulting engineer, that its proposed Sultan River hydroelectric development is impractical at this time, unless the PUD could secure financial aid from some other agency.

The project cannot be financed by the district at this time pursuant to its existing bond resolution, in terms of revenue bonds which would enjoy an equal lien with existing revenue bonds of the district, Beck said. Earnings of the district would support the issue of additional bonds, he said, but coverage on the bonds the PUD issued several year ago to buy Puget Sound Power & Light Co. properties would be reduced to a margin so small it would conflict with the acquisition bond resolution.

Should the PUD finance and construct the project, it would be penalized for many years by higher basic power costs, placing the district at a disadvantage in attracting new industries, Beck added.

The project previously had been declared feasible from an engineering point of view.

## BPA Will Award $13 Billion In Construction Contracts

Construction contracts totaling approximately $13 million will be awarded by the Bonneville Power Administration in 1951, Bonneville Administrator Paul J. Raver told 150 Western contractors, meeting at Portland with BPA staff members.

The 1951 contracts call for clearing 592 miles of right-of-way in Oregon, Washington, Idaho and Montana; construction of transmission lines from McNary Dam to LaGrande, Bandon and Gold Beach, in Oregon, and Bonners Ferry and Sandpoint, Idaho, and 30 new substations and 18 microwave towers.

Administrator Raver told the contractors that the Corps of Engineers, Bureau of Reclamation and Bonneville are preparing plans for speed up of both construction and transmission facilities at the request of President Truman for consideration by national defense agencies.

The contractors were told that the system recommended to serve anticipated power loads and carry new hydroelectric generation from dams now under construction and scheduled will require 5,000 miles of high-voltage lines and 1,100 miles of 115-kv. lines.

Without considering the impact of the war in the Orient, Dr. Raver said, growth of the Pacific Northwest during the next six years, will require an estimated $400 million worth of additions to the federal power system.

● COWLITZ COUNTY PUD of Longview, Wash., has purchased six circuit breakers from Westinghouse Electric Corp. for installation in its Longview and Kelso substations. Purpose of the installations is to further sectionalize electrical districts by reducing their size. Delivery of the equipment is scheduled for March.

● SEATTLE Municipal Board of Public Works has awarded an $899,178 contract for plate steel penstock liners for four units at Ross Dam power plant to the American Pipe and Construction Co., Portland. The liners will be fabricated at the site, northeast of Seattle, and welded in place under a contract still to be awarded.

## ANDERSON DAM RANCH DEDICATION DELAYED

Dedication of the Bureau of Reclamation's Anderson Ranch dam on the south fork of the Boise River will be delayed until spring, Morrison-Knudsen company of Boise, one of the principal contractors, made the announcement.

Dam dedication ceremonies had been set by the Bureau of Reclamation for Nov. 20, but were postponed less than a week before that date because of mechanical failure which developed in the first electric generator during a test run.

Although the generator will "go on the line" late this month, weather conditions have created hazardous driving conditions that are not likely to improve before next spring.

The hydroelectric installation at the earth-fill dam—highest of its kind in the world—was started in 1941, but construction was delayed during World War II because of the channeling of essential materials into war plants.

## Seattle Awards Contracts on Ross Hydroelectric Plant

Seattle, Wash., Municipal Board of Public Works has awarded a $1,008,653 contract for plate steel penstock liners at the new Ross hydroelectric plant and recommended to the city council appropriation of $1,150,000 for a City Light substation expansion program.

The contract, involving fabrication of liners for four units of the power plant, was awarded to the Consolidated Western Steel Co. of Los Angeles.

The substation expansion program calls for construction of ten new 6,000-kva. unit substations and equipment for converting six existing 3,000-kva. substations into stations of 6,000-kva. capacity each. The new substations are expected to go into operation early in 1952.

Organizations that maintain bound volumes of ELECTRICAL WEST may now obtain the magazine recorded on microfilm—with two volumes totaling one year's issues on a single film. Volumes 102-103 for the year 1949 may be purchased from University Microfilms, 313 N. First St., Ann Arbor, Mich., at the nominal price of $4.50. Volumes 104-105 for 1950 will be available shortly.

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## PUDs NEED OWN FACILITIES, MEETING TOLD

Washington state PUDs agreed, at their recent annual meeting in Seattle, that they must develop electric-generating facilities to supplement federal projects if they are to develop industries and meet defense needs in their areas.

First projects under this program undoubtedly would be hydroelectric, although steam generating plants are a possibility for the future and to firm the power from the hydroelectric plants. Some are too large for one district to finance, which would mean cooperation of two or more districts. Legality of such cooperation is before the courts in connection with proposed PUD purchase of Puget Sound Power & Light Co. properties.

Priority of the projects probably will be determined by the Defense Power Administration. Among those in the forefront are a $500,000 hydroelectric dam on the Hoh River for the Clallam County PUD, now awaiting REA approval of plans; the 50,000-kw. Box Canyon hydroelectric development of the Pend Oreille PUD; the 100,000-kw. Sultan River hydroelectric development of the Snohomish County PUD; a 20,000-kw. development on the Little White Salmon River for the Skamania PUD and the $7,000,000 Packwood Lake development of the Lewis County PUD.

The PUDs agree in general with the report made by Holland H. Houston for the Public Service Commission and the State Department of Conservation and Development which estimates that steam-generated power would cost about 6 mills a kwh., including transmission expense. Hydroelectric power on federal projects authorized to date can be produced at less than 6 mills but power cost of federal projects not yet authorized but listed by Army Engineers for future development would approach this figure.

The PUD association elected S. A. Sween of the Snohomish PUD as its new president, with Chauncey Price of Skamania, vice-president; Harvey Benson of Anacortes, secretary, and Irvin Woods of Okanogan, treasurer. New trustees are Dan Jolley of Franklin, George Hamilton of Douglas and Gus Peters of Chehalis.

● FPC has authorized the Montana Power Co., Butte, Mont., to issue $10,000,000 principal amount of 2½% promissory notes to be issued on or before March 1, 1951 and to mature on July 1, 1954.

## IRRIGATION DISTRICT HAS REPORT ON DEVELOPMENT

Directors of the Oroville-Wyandotte Irrigation District, California, have received from Frank E. Bonner, hydraulic engineer, a formal study of a $27,000,000 power and water development, to be financed by sale of revenue bonds. An assessment program of another $25,000 to cover survey costs is under consideration for the district's Feb. 7 ballot.

Bonner's plan, based on the district's water rights to the flow of the South Fork of the Feather River, calls for three dams and two power plants. Two rock-filled dams will store 42,000 and 55,000 acre ft. respectively, and a concrete arch dam will store 4,800 acre ft. Existing storage at Lost Creek reservoir is 55,000 acre ft., making a total of 107,300 acre ft.

Woodleaf plant, generating 32,500 kw., will be fed from Lost Creek through a 15,000-ft. diversion tunnel. The smaller plant at Forbestown, five miles above Enterprise, will have an 800-ft. tunnel and will generate 18,000 kw. The latter will have a tail water elevation of 980 ft. from which irrigation diversion can be made to reach the higher parts of the district.

Bonner states that he has made "informal negotiations" with the Pacific Gas and Electric Co. for the sale of the 230,000,000 average kwh. that the project would produce annually over the bond amortization period.

## Albeni Falls Bid Above Estimate; Delay Possible

Low bid received by the Corps of Engineers at Seattle for first-stage construction of Albeni Falls hydroelectric dam in northwest Idaho was 43% above the estimate, necessitating referral to the Chief of Engineers and entailing the possibility of delay in construction. New bids were to be opened Jan. 4 at Seattle.

The Macco Corp. of Paramount, Calif., asked $539,900 for the work, as compared to the estimate of $377,456. The proposed contract involves excavation and building of coffer dams, with completion scheduled for next May.

The dam would be on the Pend Oreille River in Idaho, two miles east of Newport, Wash. It would generate 42,000 kw. of power and provide 1,140,000 acre-ft. of usable storage which would increase the prime power production of Grand Coulee and other downstream Columbia River plants by an estimated 125,000 kw.


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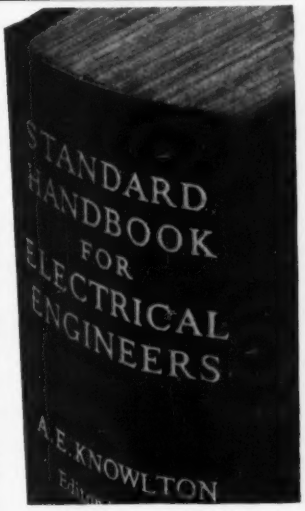


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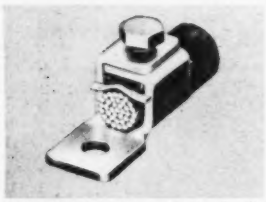

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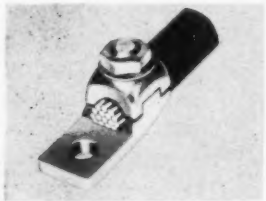

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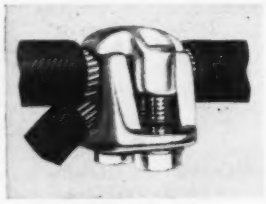

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## RAINS, SNOW FILL RESERVOIRS IN PACIFIC NORTHWEST

Heavy rains and snows that have filled reservoirs bring prospect of a steady flow of power in the Pacific Northwest this winter, Paul J. Raver, Bonneville Power Administrator, reported to the Columbia Basin Interagency committee meeting at Portland in mid-December. Present prospects are that all electrical loads, including interruptible aluminum loads, can be carried through the winter season, Raver said.

Some interruptions are possible during peaking periods in January and February, however, he said. Utility operators at the time of the meeting were having to generate about 170,000 kw. from steam stand-by plants at peak hours and probably will have to stretch this to 220,000 kw. in February.

Except for three days in November water was spilled daily over Bonneville and Grand Coulee dams up to the middle of December.

## Mexico May Use Air Force to Help Fight Power Shortage

Mexico may soon use its air force to help fight that country's power shortage. Because conditions affecting Mexico City's hydro generation are similar to those of the California Electric Power Co.'s Bishop Creek watershed, the Mexican Air Force has loaned Capt. Julio Cal-y-Mayor to the Commission Federal De Electricidad for study of Cal Electric's dry ice seeding techniques.

With plenty of clouds but little rain in Mexico's mountains, and with hydro plants operating at elevations from 3,000 to 14,000 ft., the commission wants to know more about the methods used successfully by the Southern California utility. Capt. Cal-y-Mayor will learn the art of artificial cloud nucleation from Robert Symons, the Cal Electric areologist who has piloted the company's B-38 for two successful seasons.

Capt. Cal-y-Mayor will return to Mexico and train a staff to seed clouds in specific areas.

## FPC License Requested for Cabinet Gorge Project

License for the proposed Cabinet Gorge hydroelectric development on the Clark Fork River in Bonner County, Idaho, and Sanders County, Mont., has been requested of FCC by the Washington Water Power Co. The development is expected to cost $40,000,000 and to have an ultimate installed capacity of 200,000 kw.

The project would include a reinforced concrete arch dam, about 160 ft. high, with crest gates at the Cabinet Gorge site in Bonner County; a reservoir about 20 miles long, with an area of 1,200 acres; intake works; four 480-ft. pressure tunnels; four-unit power house; 230-kv. line connecting the plant with the company's Spokane system.

## Bonneville Completes Major Addition to Washington Grid

With completion of a new 150,000-kva. transformer bank at the Olympia, Wash., substation and a 60-mile Covington - Olympia 230,000 - volt steel tower transmission line, a major addition to Bonneville Power Administration's western Washington high-voltage grid was energized Dec. 3. Conversion of the Olympia-Chehalis line operating at 115,000 to 130,000 volts, together with the Covington-Olympia line, will increase power capacity of the high-voltage grid serving the Olympia peninsula and Grays harbor area by more than 230,000 volts, according to Paul J. Raver, Bonneville administrator.

● THE ELEVENTH new substation installed by the Sacramento, Calif., Municipal Utility District in 1950, is now in service in Elverta. The new unit was placed in service following completion of the conversion of subtransmission lines from 22,000 volts to 60,000 volts. Two additional substations were scheduled to go into service last month, Paso Heights and the Del Paso Manor area.

● CLARK COUNTY PUD of Vancouver, Wash., has sold a $5,792,000 bond issue to the Ballard-Hassett Co. of Des Moines, Iowa, to refund $5,602,000 worth of bonds issued in 1948 and $190,000 worth of bonds issued in 1946.

● BIDS for equipment and material costing more than $150,000 have been called by two Washington state PUDs. The Cowlitz County PUD will receive bids at Longview until Jan. 16 for four voltage regulators and three 3,000-kva. 67-kv. transformers. The regulators will be 300 and 500 kva. 13.8 and 4.33 kv. The Chelan County PUD will receive bids at Wenatchee until Jan. 15 for materials needed in the construction of 24 miles of 33-kv. transmission line.

## BULLETIN OF FACTS PUBLISHED BY PIP

The *Fact Finder*, a publication to present pertinent industry information in compact form, is being produced by Bozell & Jacobs Inc. as part of the Electric Companies Public Information Program. Information covers public as well as business-managed utilities and is drawn from a variety of sources.

Among the sections of the book are: The Electric Industry Today; Public Power; the Problem of a National Power Policy; the Preference Clause; Sixteen Myths of Public Power; Quotable Quotes. The *Fact Finder* in loose-leaf form is a continuing PIP project and data will be brought up to date and new material added as warranted.

## Rigger Crew Performs Time-Saving Feat

A time-saving engineering feat was accomplished by the rigger crew at Public Service Co. of Colorado's $23,000,000 nearly completed Arapahoe steam-electric plant in South Denver.

A 112-ton, 40,000-kw. generator was delivered in one piece by Westinghouse, which shipped the big piece of equipment from Pittsburgh on a flat car. It came sealed airtight and specially braced to protect bearings and precision-balanced rotor. Two braided lengths, each formed of six strands of 7/8-in. cable were crossed under the huge cylinder and L. C. McFadden, rigger foreman, gave the "Alley-oop" signal.

A 30-ft. vertical lift was applied by the traveling crane inside the building and the giant generator was lowered gently to its prepared, permanent position without incident.

## Contracts Let on Jones Lake Development by B. C. Electric

Contracts have been placed by B. C. Electric for equipment for its new 80,000-hp. hydroelectric plant at Jones Lake, according to Tom Ingledow, vice-president and chief engineer. Contracts valued at $1,217,000 have been let by the company to the Vancouver Engineering Works and the Canadian General Electric Co.

This Fraser Valley development, with an over-all cost of $10,000,000 will be completed in the autumn of 1952 and will furnish enough new power to light a million 60-watt lamps.

An estimated 150,000 man-hours of work will be required to fabricate the 480,000-lb. turbine at Vancouver Engineering Works.

A six-nozzle, vertical-shaft machine, it will be generally similar to those at Bridge River, Ingledow explained. However, blueprints have been adapted to handle Jones Lake's 2,000-ft. head, which is among the highest on this continent. Designer of the turbine is Pelton Water Wheel Co., San Francisco.

● PACIFIC COUNTY PUD of Raymond, Wash., has sold $800,000 worth of bonds that will retire $622,000 in bonds issued in 1945 and 1948 and provide $167,000 for needed construction. Interest rate on the new bonds, which will mature from July 1951 to January 1965, is from 1.5 to 2.25%.

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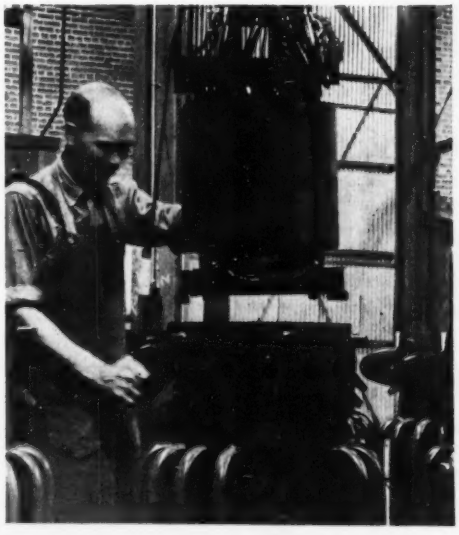
Your Eastern principals are entitled to free listing in the forthcoming 1951 April Manufacturers' Directory. Check to be certain they have sent us listing showing Western Representatives and addresses.



*Guiding core and coil assembly of a Gardner 50 KVA, oil-filled, self-cooled transformer as it is lowered into position in the tank.*

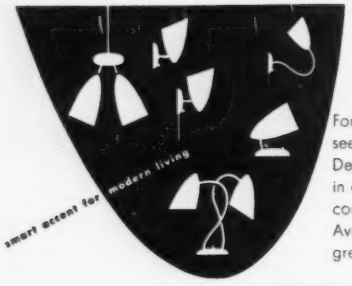
Expert Attention

Every step in production under the care of an expert—that's the Gardner standard of transformer construction. Each detail checked and re-checked to assure that the completed transformer meets the specification. Maximum power output and low cost operation is assured by Gardner design, Gardner workmanship, and Gardner inspection.

Gardner Electric Mfg. Co.
EMERYVILLE 8 CALIFORNIA

Representatives
WEST COAST
MAYDWELL & HARTZELL, INC.
MOUNTAIN STATES
ELECTRICAL SPECIALTY CO.

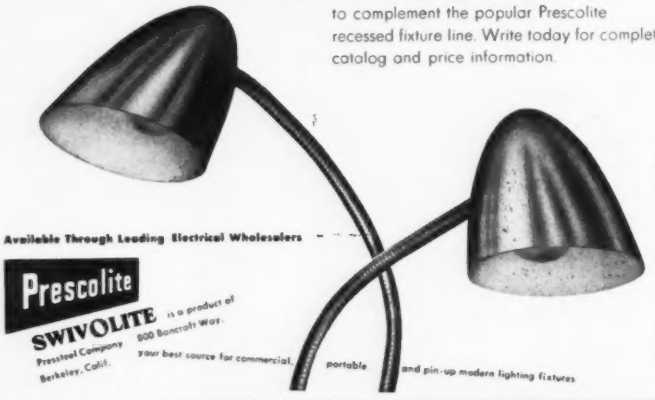
GARDNER TRANSFORMERS GUARD PROFITS




For the finest in contemporary lighting see Prescolite's new Swiv-O-Lite line. Decorative distinction and rigid construction in a wide range of functional designs for commercial portable and pin-up installation. Available in six decorators finishes — coral, green, gray, satin chrome, brass and bronze.

PRESCOLITE'S new **SWIVOLITE**

to complement the popular Prescolite recessed fixture line. Write today for complete catalog and price information.



Available Through Leading Electrical Wholesalers

Prescolite

SWIVOLITE is a product of Prescolite Company, 800 Bancroft Way, Berkeley, Calif.

your best source for commercial, portable and pin-up modern lighting fixtures

* individually packed — one fixture to a carton



Minerallac

JIFFY CLIPS

SAVE TIME when hanging pipe, conduit, BX cable, etc., by using these strong ribbed JIFFY CLIPS. Only one bolt or screw is required. Their expert design and quality materials will assure long, trouble-free service at a surprisingly low cost.

AVAILABLE NOW in Cadmium plated steel or Everdur.

Ask Your Jobber for JIFFY CLIPS

GEO. E. HONN CO.

Phone Sutter 1-7352

420 Market St. San Francisco, Cal.

ALL the strength and durability inherent in steel are combined—with definite economies—in Crapo Galvanized Steel Strand. Heavy, ductile, tightly-bonded zinc coatings, applied by the famous Crapo Galvanizing Process, provide lasting protection against corrosion.

Ask the distributor of Crapo Galvanized Products near you or write direct for further information!

INDIANA STEEL & WIRE CO.

MUNCIE, INDIANA


## RECOUNT HALTED ON PUGET POWER PURCHASE IN SEATTLE

Recount of votes on the proposed purchase of Puget Sound Power & Light Co. properties by the City of Seattle, Wash., was halted until Jan. 8 because of the holidays. Completion of the recount thus will be delayed until about Jan. 22, according to Robert A Morris, King County auditor.

The first three days of recounting disclosed no major irregularities. The canvass was ordered by the county election board after a report by County Prosecutor Charles O. Carroll that there were discrepancies in vote tabulations on the purchase measure. Election-night tabulations indicated the measure was defeated but counting of absentee ballots and correction of errors gave it a favorable margin of some 600 votes.

## Project Studies Gas Turbine for Sawmills

The Boeing Airplane Co. of Seattle is cooperating with the engineering experiment station of Oregon State College in a research project aimed at development of a gas turbine to generate power for operating sawmills and other plants that are isolated from electrical and water power but have readily available supplies of wood.

Boeing has provided technical data on the gas turbine it has developed to utilize liquid fuels while George H. Atherton of OSC is building a pilot plant to obtain data for determining the industrial feasibility of the proposed process.

Gas to operate the turbine would be generated by burning wood under pressure in a specially designed furnace. Results of the preliminary experiments indicate the process is feasible.

Work in progress is aimed at determining the size of furnace required to operate a turbine of sufficient size to supply power for a small sawmill. Pending availability of a production model turbine for final test runs, an aircraft engine exhaust-gas turbo-supercharger having comparable fuel requirements is being used to evaluate various furnace designs.

● CONSTRUCTION of a 30-mile 69-kv. transmission line from Salmon, Idaho, to the Blackbird mining district offered many erection problems to Idaho Power Co. crews because of rugged terrain in virgin territory. Steep access roads were built, swamp lands bridged, cables swung across deep gorges. Three summits were crossed, the highest 8,600 ft.

## NOTES ON THE TRADE

● PACKARD-BELL has created a post in northern California with the appointment of DEAN PULSIFER as district sales manager for the area. Pulsifer was formerly with Dalco, and prior to that with Westinghouse in the Northwest. The company has also appointed WILLIAM FROST, former assistant general sales manager, to the new position of southern California district sales manager for Packard-Bell. Succeeding Frost as assistant to the sales manager is THOMAS TALMADGE, former representative with Packard-Bell distributors, Fred Steven and Dusty Rhodes.

● CONSTRUCTION work has started for enlargement of the sheet and tin mill at the Pittsburg, Calif., plant of Columbia Steel Co. The multi-million-dollar enlargement program will increase the cold-reduced sheet and tin plate production by some 215,000 net tons annually.

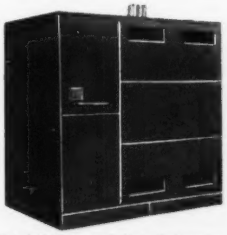
● CENTURY DISTRIBUTING CO., a new firm recently organized in Denver, will handle housewares, gift items, toys and electric housewares. HAROLD LEVINE, formerly of Flak's Inc., heads the company as general manager, with JACK PITTER, also formerly with Flak's, as co-owner and sales manager.

● NAT NIGBERG INDUSTRIES, a new sales organization designed to service West Coast dealers with a multiple line of major appliances, has been formed in Los Angeles, with Nat Nigberg as president. Nigberg announces that his organization has been appointed exclusive West Coast sales agency for Dortch Stove Works, Harron Stove & Foundry Co., Barton Washers, Pathe Television and Ultra-Cold Refrigerators Inc.

● COLUMBIA DISTRIBUTING Corp., Seattle, has become exclusive distributor for Hoover automatic electric hand irons, floor polishers and dustettes for the states of Oregon and Washington. The firm also handles distribution on Admiral television and radio, Presto products and ABC washers.

● RAYCRAFT CO., Oakland, will distribute the full line of washers, dryers and ironers, made by Horton Mfg. Co. Territory served will be northern California and Reno.

100 KVA Type F Transformer
2400/120/240



450 KVA, Type F Unit Substation,
4160 V. Delta, 60 Cycles, 3 ∅—
120/208Y, 4 wire.

ONE OF THE WORLD'S LARGEST MANUFACTURERS OF DRY TYPE TRANSFORMERS *EXCLUSIVELY*

1 to 2,000 KVA up to 15,000 Volts to meet Individual Requirements

- DISTRIBUTION
- GENERAL PURPOSE
- UNIT SUBSTATION
- PHASE CHANGING
- ELECTRIC FURNACE
- RECTIFIER
- WELDING
- MOTOR STARTING
- SPECIAL

Made by a pioneer in the dry type, air-cooled transformer field. Eliminate need for liquid filled units. No hazardous, inflammable oil or toxic liquid to fuss with. Maintenance of oil level, foreign matter, sludge accumulation, and subsequent filtering are relegated to the "horse and buggy days".

**MARCUS DRY TYPE, AIR-COOLED TRANSFORMERS**

*ARE SAFE* — No explosion or fire hazards. No fire proof vaults. Class B and C heat proof insulations.

*ARE ECONOMICAL* — Lower cost installation and operation, negligible maintenance.

*For the transformer that's second to none, specify MARCUS.*

Sales Representatives —
ROBERT A. YOUNG & COMPANY
Los Angeles 15, California
•
E. B. COOK COMPANY
San Francisco, California
•
W. R. HENDREY COMPANY
Seattle 4, Washington

MTC
MARCUS
TRANSFORMER CO.
INC.
40 MONTGOMERY STREET
HILLSIDE 5, NEW JERSEY

PIONEERS IN THE FIELD OF AIR-COOLED TRANSFORMERS

● KENDALL L. HOWE, Seattle manager of Westinghouse Electric Corp., has been named vice-chairman of the Washington State Institute of Technology. HAROLD I. PEYTON, Spokane, was elected chairman.

● FERGUSON ELECTRIC Co. Ltd. has opened its new store in Prince George, B. C. In addition to handling all types of radio and appliance sales and service work, the company is engaged in electrical contracting jobs in connection with mills and other industrial activities in the Prince George area.

● GEORGE E. MACDONALD, president of MacDonald's, Victoria, B. C., announces that the company now covers all of Vancouver Island, making it one of the largest individual electrical appliance dealer organizations in Canada.

● MCLENNAN, MCFEELY & PRIOR Trading Co. Ltd. is the name of a new company organized in Vancouver, B. C. This comes as a result of the recent change in the management of McLennan, McFeely & Prior Ltd. organization, with the taking over of ownership of controlling stock by the Ashdown Hardware Co. of Winnipeg.

● HOFFMAN Radio Corp., Los Angeles, has added two more plant units, bringing the total units it operates to nine. Both of the new units will be part of Hoffman Sales Corp.

● CENTRAL STATION ENGINEERING Co., Tucson, has been named Arizona representative for the I-T-E Circuit Breaker Co. of Philadelphia, and its subsidiary Railway and Industrial Engineering Co., Greensburg, Pa. CLYDE F. LEWIS is general manager of Central Station Engineering Co.

● DIAMOND ELECTRIC MOTOR REPAIR, Salt Lake City, has been named a dealer and certified service shop for Allis-Chalmers motors and controls in the state of Utah, some counties of Wyoming and Idaho.

● VAN BAGGEN ELECTRIC recently opened its third store at Commercial Drive and Broadway, Vancouver, B. C. The firm operates an electrical and radio service and contracting business.

● JACK KAUFMAN, president of Lewis & Kaufman Inc., West Coast electron tube manufacturing company, has announced that a group headed by him has purchased the entire capital stock of Taylor Tubes Inc., Chicago manufacturers of transmitting, industrial and television tubes. Kaufman, who will direct the operations of both companies, announces that the management personnel with the Taylor organization will be retained. Before becoming president of Lewis & Kauffman, Kauffman was president of the firm of Heintz & Kauffman Ltd., San Francisco tube manufacturer.

● FRANK HEVESY, former assistant advertising manager of Hoffman Radio Corp., Los Angeles, has become advertising manager for Hoffman Radio Sales Corp., succeeding Bud Lewis.

**When Federal Electric Products Co. held open house to show the trade its complete new facilities in Los Angeles to make all types of switchboards and panelboards or other enclosures and to supply from its warehouse packaged items made in its factory at Hartford, Leonard P. Shelley, Western division manager, left, also introduced the flexible Stab-lok circuit breaker by showing a blown-up working model. A few of the 500 who attended the opening are pictured here: Shelley, Rex Palmer, Associated Wholesale; Dave Chilvers, same; Shaw of Shaw Electrical Service, contractor; H. Castale, Inglewood Wholesale Electric; Lou Zima, Zimco Wholesale Electric; Brock, Courtesy Wholesale Electric Co.; Pat McCaughey, merchandise manager, Federal, from Newark, who came West for the new plant opening at Los Angeles. He is at the extreme right in the picture.**

**Infrared lamps had a new application when they were used to help dry out sodden playing field at the University of California for the Stanford-California Big Game**

# *"You Build for your own and your country's future when you save..."*

**BENJAMIN F. FAIRLESS**
President, U. S. Steel Corporation

***"A free economy, such as ours, is built on the savings of the people. And the future security of America depends on the initiative and the growth of every citizen. We in U. S. Steel encourage our employees to join the Payroll Savings Plan, and we are proud that the National Tube Company, one of our subsidiaries, was the first of the large industrial companies of the nation in 1950 to have more than 80% of its employees participating. Remember, you build for your own and your country's future when you save."***

Mr. Fairless is not expressing a personal opinion, nor is he speaking for other far-seeing executives when he tells you that our economy is built on the savings of the people and a man builds for his own and his country's future when he saves.

Actually, Mr. Fairless is merely putting in words the thoughts and action of the millions of employed men and women who *now hold* more than 50 billion dollars in U.S. Savings Bonds.

$50,000,000,000! Who *sold* all those bonds to millions of people? The answer is, nobody sold them.

80% of the employees of the National Tube Company ... 75% of the employees of Carnegie-Illinois Steel Company ... thousands of employees of other U.S. Steel subsidiaries ... more than 8 million employees of other companies bought U.S. Savings Bonds and are buying them every month on the easy, automatic Payroll Savings Plan. Their employers merely offered these men and women an opportunity to save for their future. There was no pressure, no emotional appeal.

How does employee participation in *your* Payroll Savings Plan match up with the 80% of National Tube, the 75% of Carnegie-Illinois? Or, perhaps you are one of the relatively few large companies that do not have a Plan? In either case, wire or write, Savings Bond Division, U.S. Treasury Department, Suite 700, Washington Bldg., Washington, D.C. Your State Director is ready to help you with a package plan—application blanks, promotional material, practical suggestions and all the personal assistance you may desire.

*The U. S. Government does not pay for this advertising. The Treasury Department thanks, for their patriotic donation, the G. M. Basford Company and*

ELECTRICAL WEST

# Utica Lubring Pliers..

## with built-in lubrication

LUBRING pliers have a ring of porous, oil-impregnated iron in the joint. This ring carries no stress but feeds lubrication to assure a smooth, free-working joint.

Linemen like their "heft" and feel and power... management likes their long-run economy.

*Also available with splicing grooves (No. 259S)*

**UTICA Drop Forge & Tool Corporation**
**Utica, 4, New York**

It Pays To Use U TI CA Quality Tools

**AND THE WORLD'S BEST TOOLS ARE MADE IN U. S. A.**

**When Glenn Earl Inc. launched its new branch in Boise in conjunction with Capitol Appliance Co., Alex Kuehlthau, Coolerator representative, Gayle Sewell, owner of Capitol Appliance and Glenn Earl himself paused in front of the showroom entrance for this photo.**

● FOLLOWING the death of O. B. Stubbs, founder and president of Stubbs Electric Co., Portland, the company's board of directors elected the following officers to carry on the business: GRACE D. STUBBS, president; JOHN O. STUBBS, vice-president and financial advisor; HUGH M. HANNA, assistant general manager in charge of sales and operations; WILLIAM A. HOLLEY, assistant general manager in charge of office and credits; A. L. NICHOLS, secretary and treasurer.

● BENJAMIN A. RAGIR, president of Ekco Products Co., announces that the firm's new half-million dollar plant at Whittier, Calif., will be ready for occupancy early in January. The plant will be used for manufacturing and warehousing.

● KURT APPERT, vice-president and chief engineer of Lenkurt Electric Co., San Carlos, has become director of engineering for the company. The position of chief engineer has been taken over by George M. Lebedeff. The firm manufactures wire-line and radio carrier equipment for telephony, telegraphy, telemetering and control.

● BEGG'S HARDWARE, Aldergrove, B. C., has completed enlargement and modernization of its electrical and hardware store. While independently owned, the store is affiliated with the Marshall-Wells groups of stores in British Columbia.

● ZEE GOODMAN, former sales director at Wood & Cies Distributing Co., Los Angeles, has been appointed general manager and director of sales for Exclusive Sales Corp., distributor for Natalie Kalmus Television. Succeeding Goodman at Wood & Cies is WOLSEY BARRETT, former Los Angeles area sales manager with the firm.

● JOHN PALEY, assistant advertising manager for three years at Eastern-Columbia, recently was appointed advertising manager for Herbert H. Horn Inc., distributor of Admiral and other products in Los Angeles. He fills the vacancy caused by the resignation of RALPH KIBBEE from the Horn organization.

● GEORGE J. DUNEGAN, San Francisco, and L. F. MONAHAN, Denver, are newly appointed engineers for Baily Meter Co., manufacturer of instruments and controls.

● KAISER ALUMINUM & CHEMICAL Corp. has awarded contracts to Kaiser Engineers Inc. for a $3,700,000 building program at its Mead reduction works near Spokane, Wash. This program follows a previously announced $2,000,000 program for the addition of a seventh potline at the Mead plant.

● THE BOEING AIRPLANE Co. of Seattle, has been awarded a $140,000 contract by the Bonneville Power Administration for furnishing 18,000 new-type power transmission line suspension clamps designed to reduce radio interference. The special clamps, designed by Boeing, will be used on new lines, both steel tower and wood pole transmission lines, to hang the power conductors from standard insulator strings. Made of aluminum, they are non-magnetic to prevent power line electrical losses from action occurring on conventional steel-type clamps. Described as "corona free," the new clamp has a specially designed "skirt" to shield the vulnerable portions from the electrostatic field set up by high voltage.

● STANDARD COIL PRODUCTS Co. Inc. has arranged to acquire from Square D Co. the latter's Kollsman division, manufacturers of aircraft instruments. The business will continue to be operated with the same personnel and in the same plants.

# NEWS ABOUT PEOPLE

● RALPH J. CORDINER, who started his career in the West, became president of General Electric Co. on Dec. 15, succeeding Charles E. Wilson, now chairman of the Defense Mobilization Board. A native of Walla Walla, Wash., Cordiner helped put himself through Whitman College with money he earned selling appliances for Pacific Power & Light Co. on a part-time basis. After graduation in 1922, he was made commercial manager of a PP&L division and a year later he took a position with the Edison General Electric Appliance Co. in Portland. Later he was Northwest manager and in 1930 moved to San Francisco as Pacific Coast division manager. In 1932 he went East and at the time of his elevation to the presidency of G-E, he was executive vice-president and director of the company.

● WHEN CHARLES LUTHER HUYCK retired from Graybar and its predecessor, Western Electric Co., after 47 years, he did not desert the industry. He was made secretary-treasurer of the San Francisco Electric Club in which for many years he has conducted a weekly "broastcast" of electrical and other news in a manner no one wants ever to stop. He started with Western Electric as a boy in the warehouse, Aug. 5, 1903. At the time of his retirement he handled the company's catalog and price sheets. He found an outlet, however, for his writing talent in many ways — the weekly "Sparks" broadcast, reviews of the past week's program, correspondence for Graybar's employee magazine and occasional articles for ELECTRICAL WEST, *Electrical Wholesaling* and *Electrical World*.

● J. B. BAKER has been named operating manager of General Electric supply Corp.'s East Bay activities. His headquarters will be at the company's new Emeryville warehouse. Baker will be in charge of warehousing and all operations including the San Francisco district's product service shops and part stocks on radio, television and major appliances. He formerly was district service manager at G-E Supply's office in San Francisco.

● A. ANTHONY Ltd., Vancouver, B. C., is installing a fluorescent lighting system in all the classrooms in the new elementary school under construction at East Trail. B.C.


LOOK IT UP FIRST

in the MANUFACTURERS' DIRECTORY section of ELECTRICAL WEST.

This handy guide to Western States outlets and service facilities contains:

1 DIRECTORY OF MANUFACTURERS listing manufacturers of electrical equipment and supplies, and their principal agents in this area.

2 WHERE-TO-BUY IN THE WEST, listing products alphabetically and who sells them in the West.

3 DIRECTORY OF APPLIANCE SERVICE AND REPAIR STATIONS.

4 DIRECTORY OF MANUFACTURERS' AGENTS handling electrical lines.

This Directory is your best and most convenient source for information on electrical products in the West.

KEEP IT HANDY
USE IT REGULARLY

Published annually as a supplement to the April issue by

ELECTRICAL WEST

68 POST ST. SAN FRANCISCO 4, CALIF.

SAVE HOURS ON CONDUIT AND PIPE INSTALLATIONS

...with a GREENLEE PIPE BENDER

Cut costs, speed your jobs this efficient, easy, economical way. Make "on the job" bends in pipe and rigid conduit up to 5". thin-wall conduit and tubing with a GREENLEE Hydraulic Bender. One man operated for fast, accurate, uniform bending. Simple to operate, easy to set up and shift from job to job. Not only saves labor, but eliminates cost of many manufactured bends and fittings. Often pays for itself on first few jobs. Write today for free folder No. E-201.

TOOLS FOR CRAFTSMEN
GREENLEE

Other GREENLEE timesaving tools for industry: Hand Benders for Tubing • Hydraulic Pipe Pushers Knockout Tools • Auger Bits and Drills • Spiral Screw Drivers • Chisels and Gouges • And many others. Greenlee Tool Co., 1761 Columbia Ave., Rockford, Ill.

Andrews Weldon

● ROY E. WELDON, Los Angeles district representative for General Electric comfort appliances, blankets and vacuum cleaners, was recently awarded a bronze plaque for outstanding salesmanship, having attained top sales in two national sales contests. Hardage L. Andrews, vice-president and general manager of General Electric Co.'s Appliance and Merchandise Department, presented the plaque on a recent West Coast visit.

● PACIFIC GAS AND ELECTRIC CO. recently announced several retirement and subsequent appointments which became effective Dec. 31. O. W. PETERSON, manager of the general construction department, has retired and is succeeded by A. J. SWANK, assistant manager of the department. JOHN A. KOONTZ, chief of the division of hydroelectric and transmission engineer of the department of engineering, retired at the end of the year in accordance with provisions of the company's retirement plan. WILLIAM R. JOHNSON, assistant to the chief, will take over Koontz' responsibilities, with the title of electric generation and transmission engineer. FRANK M. HARRIS, chief of the bureau of specifications and estimates of the department of engineering, also retired from the company, and is succeeded by E. V. NOE, who has been his assistant for a number of years.

● EDWARD M. NAUGHTON has been appointed assistant general manager of Utah Power & Light Co. He has been with the company since 1935, starting as superintendent of steam-electric generating plants and later assistant to the vice-president. Other appointments within the company include that of D. D. MOFFATT Jr. assistant to the vice-president and E. ALLAN HUNTER as staff engineer.

ELECTRICAL SPECIALTY CO.

Electrical — Plastic — Mechanical Materials

Magnet Wire
Mica in All Forms
Mykroy Sheets, Rods, Parts
Plastic—Engineering, Fabricating, Engraving
Plastic Molding Materials
Pressboard
Resistance Wire, Ribbon, Metal Alloys
Scotch Tapes
Shop Equipment
Silicone Products
Transite, Ebony Asbestos
Tubings: Varnished, Saturated, Extruded
Twine: Seine, Marlin, Armature, Waxed
Varnished Cloths, Papers, Tapes
Varnishes, Enamels for Insulation
Waxes and Compounds
Wood and Formed Wedges

PRODUCTS MADE BY AMERICA'S FINEST FACTORIES

SAN FRANCISCO 3
316 Eleventh Street
HEmlock 1-5116

LOS ANGELES 13
418 E. Third Street
MIchigan 1907

SEATTLE 4
2406 First Ave. So.
ELiot 8061

DENVER 2
1015 Twenty first St.
MAin 4912

ECONOMICAL
Jeffries Transformers

Reasonable in Price
Reliable in Performance

Jeffries large transformers are priced reasonably—and you can save their first cost in a short time by minimizing current losses. When you use a Jeffries transformer, you can provide voltage change at the point desired, without prohibitive expense.

We supply all types and sizes. If not in stock, we build to order in a hurry—a week to 10 days.

Write today for catalog.

JEFFRIES TRANSFORMER COMPANY
1710 E. 57th St. Los Angeles 11, Calif.

● ROBERT W. MILLER, president of Pacific Lighting Co., San Francisco, has been made a trustee of California Institute of Technology. Miller is the first person outside southern California to be elected to the post.

## Deaths

● SAM NIDES, whose spectacular introduction to the retail electrical field occurred in Denver only three years ago, died there Nov. 26. He was 56 years old. The Nides Corp. features the entire General Electric line. With the flair for showmanship that quickly caught public imagination, Sam Nides opened his pioneer store on Denver's East Colfax avenue in true Hollywood style with two receptions, Sept. 5 and 8, 1947 (when nothing was for sale but top-bracket officials of the electrical world were present) followed by a grand opening Sept. 9. His interest centered largely in children, and a mammoth electrical train was the cynosure of all eyes at Yuletide. He had Christmas gifts for children, and each Dec. 25 contributed an electric railroad to the crippled youngsters at Boettcher School for Handicapped Children. A veteran of both World Wars, Sam Nides was stationed at Lowry Air Base, Denver, during part of the more recent war, loved the region and returned when discharged from service. Brothers Jack, who manages the East Colfax store, and Louis, who operates the more recent one on Santa Fe Drive, are carrying on in the Nides tradition. Small boys and girls, conditioned to the big electric train at Christmas, were not disappointed.

● STANLEY PEARCE, 66, first city electrician of Sacramento, died suddenly in that city. He had been employed by Vallejo Light & Power Co. and was given the city position in 1907.

● HOUGHTON H. WHITHED, 62, retired electrical engineer for Puget Sound Power & Light Co. at Seattle, died suddenly.

● BURRELL S. MANUEL, 71, retired vice-president of Westinghouse Electric Corp., died in Los Angeles recently. He was Los Angeles district manager for the company from 1927 through 1945, when he became Pacific Coast vice-president. He retired in 1947. Mr. Manuel had been with Westinghouse for 42 years.

● O. B. STUBBS, founder and president of Stubbs Electric Co., Portland, died recently.


**magno-tronic**

DUAL SILVER POINT — FULLY AUTOMATIC

**FLUORESCENT STARTERS**

—completely eliminate annoying blinking and flickering of dead fluorescent lamps!

REFLECTS THE CRAFTSMANS SKILL

GUARANTEED — FOR ONE YEAR!

**PROTECTS** — Automatic thermal relay cuts out defective lamps, eliminates annoying blinking and protects all auxiliary equipment.

**SIMPLIFIES** — Replacement of defective lamp automatically recycles starter circuit. No buttons to push — no replacement of starter.

**REDUCES COST** — Magno-Tronic starters provide exact timing of electrode heating, preventing excessive loss of emission material, thus assuring maximum possible lamp life.

**VERSATILE** — Built to operate efficiently over an extended voltage and temperature range.

Demonstration and Literature on Request.

SP-15-20 For use with 15 or 20 watt lamps.

SP-30-40 For use with 30 or 40 watt lamps.

SP-85-100 For use with 100 watt lamps.

Manufactured under U. S. PATENTS

2298236 2159837 2339307
2334935 2239244 2333694
2341520 1849532

Other Patents Pending

INDUSTRIAL ELECTRONICS CORP.

General Offices & Main Plant, 80 BANK STREET, NEWARK 2, N. J.

**KULKA Engineered WIRING DEVICES for LAMPS and LIGHTING FIXTURES**

More than a quarter century of specialization in producing soundly-engineered electrical wiring devices is your assurance of top quality products at low cost.

CURRENT TAP

No. 204. In brown Bakelite and ivory Urea. Efficient and lasting. Has shadeholder ledge. 660W-250V.

MOLDED TWIN LITE SOCKET

No. 205. Attractively designed in heavy, brown Bakelite and ivory Urea. Practical unit. 660W-250V.

WEATHER PROOF SOCKETS

No. 202A (left) Heavy Bakelite shell, with molded Bakelite insert. Bronze contact. No. 203—same style with rubber shell and Bakelite insert. No. 206 (right) Pin type—has suspension hook. No soldering. 660W-600V.

All items listed by UL

Write for Prices and Catalog

KULKA ELECTRIC MFG. CO.

30 SOUTH ST., MT. VERNON, N. Y.

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# PROFILES

## At Hawaiian PCEA Conference

**Arizona learns about electric cooking and climate in Hawaii: Mew Lun Hee, HECO home economist; Henry B. Sargent, Calapco president; Bernard F. Young, HECO commercial cooking specialist, and Gladys Miyashiro, HECO home economist**

## Westerners in New York

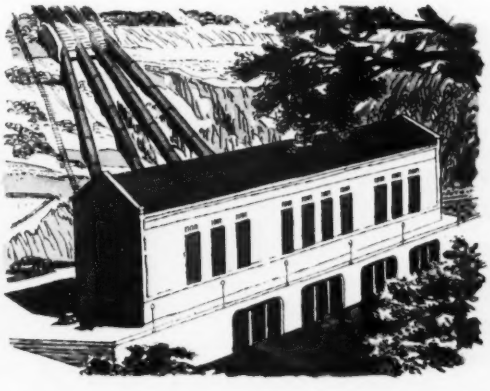
**Westerners at General Electric's major appliance distributors meeting at the Astor, New York, late November, included E. Z. Coman, GESCO, Spokane; C. W. Goodwin, GESCO, San Francisco; J. L. Busey, originally from the West, now vice-president in charge of marketing, G-E; R. S. Belnap, GESCO, Salt Lake City; and R. C. Padgett, Portland. Many others from the West were there too**

# How low-cost rural power helps give you a more profitable market

**Two billion dollars** are earned and spent by California farmers each year. This tremendous exchange of wealth means more money in circulation, more buyers for your products. Farming is a basic California industry, and its success directly influences the prosperity of the entire area.

**The purchasing power** of the California farmer is three times greater than the national average. His high income depends on irrigation which is made possible through low-cost electric pumping. An irrigated acre, for example, yields an average income of $240 a year; an unirrigated acre, $12.

**Twelve times more electricity** is put to work on a California farm than on the average out-of-state farm. And many of the extra dollars which this power helps earn find their way into many other businesses, large and small... into such industrial channels as mining, building and construction.



**Abundant power is assured**—both for the farmer and for your industry—thanks to P. G. and E.'s great expansion program which is providing plentiful reserves of electricity. We are keeping well ahead of current demand, and building more facilities for Northern and Central California's future growth.

*More power to industry—at rates among the lowest in the nation*

**P·G·and E·**

PACIFIC GAS AND ELECTRIC COMPANY

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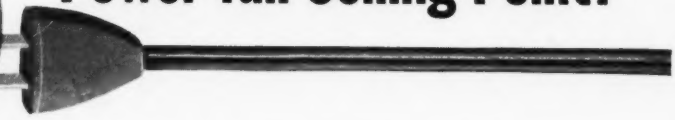
ADEQUATE WIRING SERVES AND SAVES

# Power-full Selling Point!



Adequate wiring in customers' homes gives them the performance they expect from every electrical appliance. It makes them *satisfied* customers — and good prospects for future sales.

So what happens when your customer plugs in an appliance and turns it on is important — it is the *crucial point* which makes or breaks future sales.

Appliance dealers have a vital interest in adequate wiring because it means more business and more profits. Adequately wired homes have enough circuits of the right size and enough outlets and switches—in short, enough power to guarantee top performance of all appliances.

*Adequate wiring is your best selling point.* It puts power into all the others!

## Pacific Coast Electrical Association

*601 West Fifth Street. Los Angeles 13, Calif.*

*447 Sutter Street, San Francisco 8, Calif.*